

SMT10E Series

3.0 Vin to 5.5 Vin Single output

10 A Current rating

Input voltage range: 3.0 Vdc to 5.5 Vdc

Output voltage range: 0.8 Vdc to 3.63 Vdc

Ultra high efficiency: 96% @ 5 Vin and 3.3 Vout

Extremely low internal power dissipation

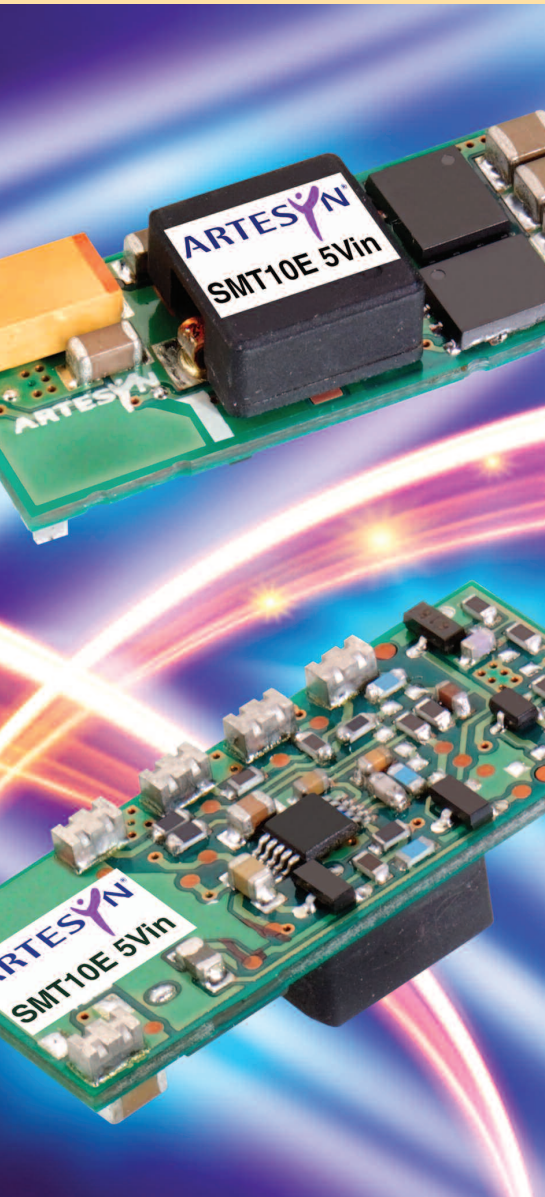
Minimal thermal design concerns

Designed in reliability: MTBF of >7 million hours per Telcordia SR-332

Ideal solution where board space is at a premium or tighter card pitch is required

Industry standard footprint and pin out

Available RoHS compliant



The SMT10E Series are non-isolated dc-dc converters packaged in a single-in-line footprint giving designers a cost effective solution for conversion from either a 5 V or 3.3 V input to output voltages of 3.3 Vdc to 0.8 Vdc. The SIL10E offers both fixed outputs and wide a output trim range, which allows maximum design flexibility and a pathway for future upgrades. Local voltage conversion by the SMT10E Series from existing 5 V or 3.3 V system voltages eliminates the need for redesign of existing power architectures when voltage requirements change. The SIL10E is

designed for applications that include distributed power, workstations, optical network and wireless applications. Implemented using state of the art surface mount technology and automated manufacturing techniques, the SIL10E offers compact size and efficiencies of up to 96%.

[2 YEAR WARRANTY]



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Stresses in excess of the maximum ratings can cause permanent damage to the device. Operation of the device is not implied at these or any other conditions in excess of those given in the specification. Exposure to absolute maximum ratings can adversely affect device reliability.

Absolute Maximum Ratings

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------------------|-----------------|------|-----|------|-------|---|
| Input voltage - continuous | V_{in} (cont) | -0.3 | | 5.5 | V DC | $V_{in(+)} - V_{in(-)}$ |
| Input voltage - peak/surge | V_{surge} | -0.3 | | 6 | V DC | 2s max, non-repetitive |
| Operating temperature | T_{op} | -40 | | 100 | °C | Measured at thermal reference points, See Note 1 for thermal Derating |
| Storage temperature | $T_{storage}$ | -40 | | 125 | °C | |
| Output power (S1V2) | P_{out} (max) | 0 | | 13.2 | W | |
| Output power (S1V5) | P_{out} (max) | 0 | | 16.5 | W | |
| Output power (S1V8) | P_{out} (max) | 0 | | 19.8 | W | |
| Output power (S2V5) | P_{out} (max) | 0 | | 27.5 | W | |
| Output power (S3V3) | P_{out} (max) | 0 | | 36.3 | W | |
| Output power (W3V3) | P_{out} (max) | 0 | | 36.3 | W | |

All specifications are typical at nominal input $V_{in} = 5V$, full load under any resistive load combination at 25°C unless otherwise stated.

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|-----------------|-----|-----|------|-------------------|--|
| Input voltage - operating | V_{in} (oper) | 3 | 5 | 5.5 | V DC | |
| Input current - no load | I_{in} | | 70 | 150 | mA DC | V_{in} (min) - V_{in} (max), enabled |
| Input current - Quiescent | I_{in} (off) | | 2 | | mA DC | Converter disabled |
| Inrush current (i^2t) | | | | | A ² μs | |
| Input ripple current | | | | | mA rms | |
| Input fuse* | | | | 12.5 | A | Slowblow/antisurge HRC recommended |

* Fuse A - S(T) 1.25 x 0.25 inches
SIBA P/N 70-065-65/12.5ARS

Turn On/Off

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---|----------------------|------|------|-----|-------|--|
| Input voltage - turn on | V_{in} (on) | 2.25 | 2.70 | 3 | V DC | Will regulate @ $V_{in} > 3V$ if $V_{out} \leq 2V5$ |
| Turn on delay - enabled, then power applied | T_{delay} (power) | | 20 | | msec | With the enable signal asserted, this is the time from when the input voltage reaches the minimum specified operating voltage until the output voltage is within the total regulation band |
| Turn on delay - power applied, then enabled | T_{delay} (enable) | | 20 | | msec | $V_{in} = V_{in}$ (nom), then enabled. This is the time taken until the output voltage is within the total error band |
| Rise time | T_{rise} | | 15 | | msec | From 10% to 90%; full resistive load, no external capacitance |

Signal Electrical Interface

| Characteristic - Signal Name | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|--------------------|-----|-----|-----|---------------|---|
| At remote/control ON/OFF pin Open collector or equivalent compatible | | | | | | See Notes 2 and 3 See Application Note 134 for Remote ON/OFF details |
| Control pin open circuit voltage | V_{ih} | | 0 | | V | $I_{ih} = 0 \mu\text{A}$; open circuit voltage |
| High level input current | I_{ih} | | | 300 | μA | Current flowing into control pin when pin is pulled high |
| High level input voltage | V_{ih} | 1.2 | | | Vin | Converter guaranteed OFF when control pin is greater than V_{ih} (min) |
| Acceptable high level leakage current | I_{ih} (leakage) | | | -10 | μA | Acceptable leakage current from control pin into the open collector driver (neg = from converter) |
| Low level input voltage | V_{il} | 0 | | 0.5 | V | Converter guaranteed ON when control pin is less than V_{il} (max) |
| Low level input current | I_{il} | | | 20 | μA | $V_{il} = < 0.4 \text{ V}$ |

Reliability and Service Life

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|--------|-----------|-----|-----|-------|--|
| Mean time between failure | MTBF | 680,000 | | | Hours | MIL-HDBK-217F, $V_{in} = V_{in} \text{ (nom)}$; $I_{out} = I_{out} \text{ (max)}$; ambient 25°C; ground benign environment |
| Mean time between failure | MTBF | 7,042,000 | | | Hours | Telcordia SR-332 |
| Mean time between failure | MTBF | TBA | | | Hours | Demonstrated. This entry will be periodically updated as the number of test hours increase |

Other Specifications

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------|----------|-----|-----|-----|---------------|-----------------------------|
| Switching frequency | F_{sw} | | 300 | | kHz | Fixed frequency |
| Weight | | | 6.3 | | g | |
| Coplanarity | | | 100 | | μm | Measured from seating plane |

EMC

Electromagnetic Compatibility

| Phenomenon | Port | Standard | Test level | Criteria | Notes and conditions |
|--------------------|-----------|-------------|------------------------|----------|------------------------------|
| Immunity: | | | | | |
| Conducted immunity | | EN61000-4-6 | | | |
| Radiated immunity | | EN61000-4-3 | | | |
| ESD | Enclosure | EN61000-4-2 | 6kV contact 8kV air | NP | As per ETS 300 386-1 table 5 |

Performance criteria:

NP: Normal Performance: EUT shall withstand applied test and operate within relevant limits as specified without damage.

RP: Reduced Performance: EUT shall withstand applied test. Reduced performance is permitted within specified limits, resumption to normal performance shall occur at the cessation of the test.

LFS: Loss of Function (self recovery): EUT shall withstand applied test without damage, temporary loss of function permitted during test. Unit will self recover to normal performance after test.

Referenced ETSI standards:

ETS 300 386-1 table 5 (1997): Public telecommunication network equipment, EMC requirements

ETS 300 132-2 (1996): Power supply interface at the input to telecommunication equipment: Part 2 operated by direct current (DC)

ETR 283 (1997): Transient voltages at interface A on telecommunication direct current (DC) power distributions

Safety Agency Approvals

| Characteristic | Notes and Conditions |
|---------------------------------------|----------------------|
| UL/cUL60950 | File No. E174104 |
| TÜV Product Services EN60950 | B03 10 38572 037 |
| CB certificate and report to IEC60950 | DE3-51686M1 |

Material Ratings

| Characteristic - Signal Name | Notes and Conditions |
|------------------------------|----------------------|
| Flammability rating | UL94V-0 |

Model Numbers

| Model Number | Input Voltage | Output Voltage | Output Current (Max.) | Typical Efficiency | Max. Load Regulation |
|----------------|---------------|----------------|-----------------------|--------------------|----------------------|
| SMT10E-05S1V2J | 3.0 - 5.5VDC | 1.2V | 10A | 89% | 1.0% |
| SMT10E-05S1V5J | 3.0 - 5.5VDC | 1.5V | 10A | 90% | 1.0% |
| SMT10E-05S1V8J | 3.0 - 5.5VDC | 1.8V | 10A | 92% | 1.0% |
| SMT10E-05S2V5J | 3.0 - 5.5VDC | 2.5V | 10A | 95% | 1.0% |
| SMT10E-05S3V3J | 4.5 - 5.5VDC | 3.3V | 10A | 96% | 1.0% |
| SMT10E-05W3V3J | 3.0 - 5.5VDC | 3.3V | 10A | 96% | 1.0% |

RoHS Compliance Ordering Information



The 'J' at the end of the part number indicates that the part is Pb-free (RoHS 6/6 compliant). TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.

S1V2 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|-----|---------|--|
| Input current - operating | I_{in} | | 2.7 | 2.8 | A DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 150 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

S1V2 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|---|
| Nominal set-point voltage | $V_O (nom)$ | 1.16 | 1.2 | 1.24 | V DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 1.14 | | 1.25 | V DC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1.0 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | A DC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 50 25 | mV pk-pk mV rms | Measurement bandwidth: 20MHz. See Application Note 168 for measurement set-up details |

S1V2 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 60 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

S1V2 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage* | | 10 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

* V_{in} (min) = 3.3V at max. trim-up

S1V2 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 86.0 | 89.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 86.0 | 89.0 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

S1V5 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|-----|---------|--|
| Input current - operating | I_{in} | | 3.3 | 3.4 | A DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 150 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

S1V5 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|---|
| Nominal set-point voltage | $V_O (nom)$ | 1.45 | 1.5 | 1.55 | V DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 1.42 | | 1.57 | V DC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1.0 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | A DC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 50 25 | mV pk-pk mV rms | Measurement bandwidth: 20MHz. See Application Note 168 for measurement set-up details |

S1V5 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 60 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

S1V5 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage* | | 10 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

* V_{in} (min) = 3.3V at max. trim-up

S1V5 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 88.0 | 90.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 88.0 | 90.0 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

S1V8 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|-----|---------|--|
| Input current - operating | I_{in} | | 3.9 | 4.1 | A DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 150 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

S1V8 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|---|
| Nominal set-point voltage | $V_O (nom)$ | 1.75 | 1.8 | 1.86 | V DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 1.72 | | 1.88 | V DC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1.0 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | A DC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 50 25 | mV pk-pk mV rms | Measurement bandwidth: 20MHz. See Application Note 168 for measurement set-up details |

S1V8 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 60 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

S1V8 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage* | | 10 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

* V_{in} (min) = 3.3V at max. trim-up

S1V8 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 89.5 | 92.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 89.0 | 91.5 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

S2V5 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|------|---------|--|
| Input current - operating | I_{in} | | 5.3 | 5.45 | A DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 200 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

S2V5 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|---|
| Nominal set-point voltage | $V_O (nom)$ | 2.43 | 2.5 | 2.57 | V DC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 2.38 | | 2.612 | V DC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1.0 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | A DC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 60 25 | mV pk-pk mV rms | Measurement bandwidth: 20MHz. See Application Note 168 for measurement set-up details |

S2V5 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 50 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

S2V5 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|---------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage* | | 10 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

* V_{in} (min) = 3.3V at max. trim-up

S2V5 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 92.5 | 95.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 91.5 | 90.0 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

S3V3 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|-----|---------|---|
| Input current - operating | I_{in} | | 6.9 | 7.1 | ADC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 150 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

S3V3 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|--|
| Nominal set-point voltage | $V_O (nom.)$ | 3.21 | 3.3 | 3.39 | VDC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 3.15 | | 3.45 | VDC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | ADC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 50 25 | mV pk-pk mV rms | Measurement bandwidth 20MHz See Application Note 168 for set-up details |

S3V3 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 50 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

S3V3 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage | | 10 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

S3V3 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 93.5 | 96.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 93.5 | 95.3 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

W3V3 Model

Input Characteristics

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|-------------------------------------|-------------------|-----|------|-----|---------|---|
| Input current - operating | I_{in} | | 7.0 | 8.0 | ADC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (max.)$; $V_O = V_O (nom)$ |
| Reflected ripple current | $I_{in} (ripple)$ | | 150 | | mA rms | $I_{out} = I_{out} (max.)$, measured without external filter |
| Input capacitance - internal filter | C_{input} | | 18.8 | | μF | Internal to converter |
| Input capacitance - external bypass | C_{bypass} | 100 | | | μF | Recommended customer added capacitance |

W3V3 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------------|------------------------|------|-----|----------|--------------------|--|
| Nominal set-point voltage | $V_O (nom.)$ | 3.21 | 3.3 | 3.39 | VDC | $V_{in} = V_{in} (nom)$; $I_{out} = I_{out} (nom)$ |
| Total regulation band | V_O | 3.15 | | 3.45 | VDC | For all line, static load and temperature until end of life |
| Line regulation | | | 0.2 | 0.5 | % | $I_{out} = I_{out} (nom)$; $V_{in} (min)$ to $V_{in} (max)$ |
| Load regulation | | | | 1 | % | $V_{in} = V_{in} (nom)$; $I_{out} (min)$ to $I_{out} (max)$ |
| Output current continuous | I_{out} | 0 | | 10 | ADC | |
| Output current - short circuit | I_{sc} | | 10 | 20 | A rms | Continuous, unit auto recovers from short, $V_O < 100mV$ |
| Output voltage - noise | V_{p-p} V_{rms} | | | 50 25 | mV pk-pk mV rms | Measurement bandwidth 20MHz See Application Note 168 for set-up details |

W3V3 Model

Electrical Characteristics - O/P

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--|----------------|-----|-----|--------|-----------|--|
| Load transient response - peak deviation | $V_{dynamic}$ | | 50 | | mV | Peak deviation for 50% to 75% step load, $di/dt = 100mA/\mu sec$ Measurement taken with no external capacitors |
| Load transient response - recovery | $T_{recovery}$ | | 50 | | μsec | Settling time to within 1% of output set point voltage for 50% to 75% step load. Measurement taken with no external capacitors |
| External load capacitance | C_{ext} | 0 | | 10,000 | μF | |

W3V3 Model

Protection and Control Features

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|--------------------------|--------|-----|-----|-----|--------|---|
| Allowable output voltage | | 75 | | 10 | % % | Trim up (% of V_O nom). Trim down (% of V_O nom) See Application Note 168 for details of trim equations and trim curves |
| Remote sense voltage | | | | 10 | % | If trim up is invoked de-rate power accordingly (remote sense + trim $\leq 10\%$) |

W3V3 Model

Efficiency

| Characteristic | Symbol | Min | Typ | Max | Units | Notes and Conditions |
|----------------|--------|------|------|-----|-------|--|
| Efficiency | η | 94.0 | 96.0 | | % | $I_{out} = 100\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |
| Efficiency | η | 94.0 | 95.0 | | % | $I_{out} = 50\% I_{out} (max)$, $V_{in} = V_{in} (nom)$ |

S1V2 Model

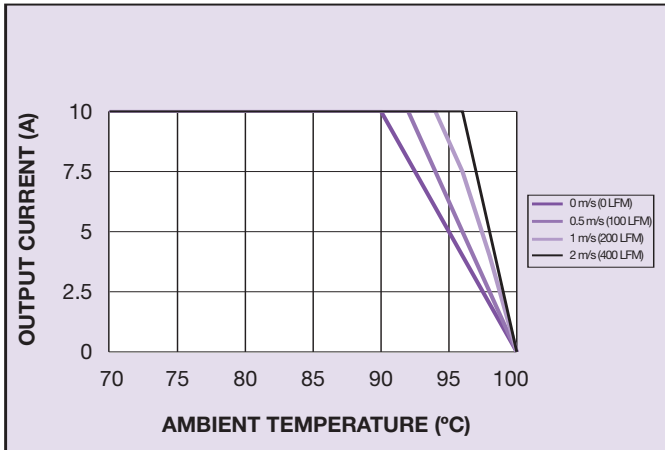


Figure 1: Derating Curve with $V_{in} = 5V$ and $V_{out} = 1.2V$

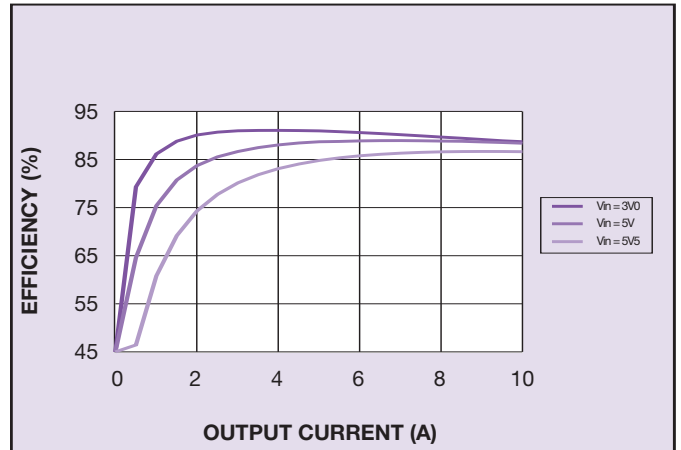


Figure 2: Efficiency vs Load

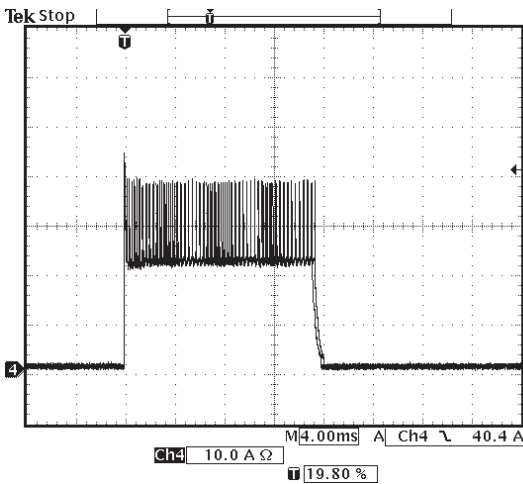


Figure 3: Short Circuit Characteristic (Channel 1: $I_{s/c}$)

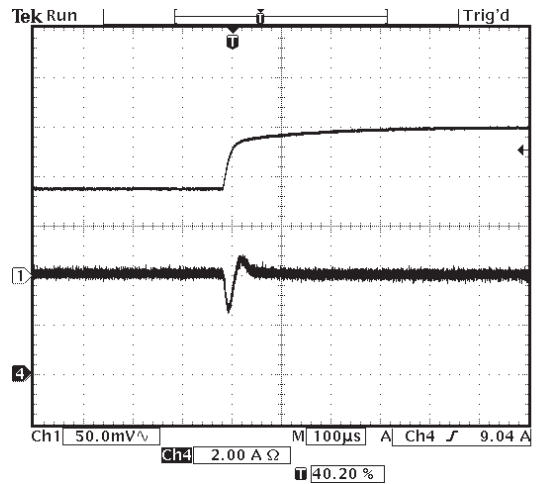


Figure 4: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

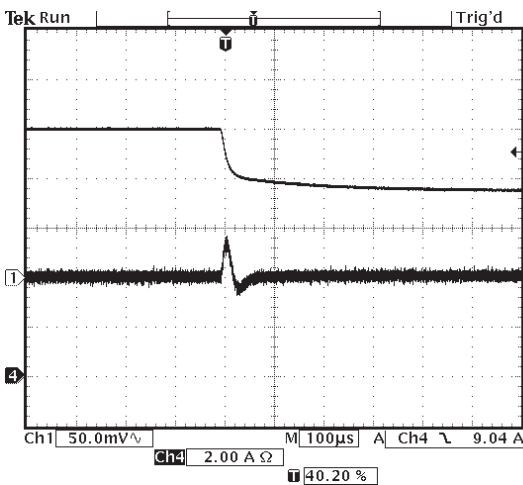


Figure 5: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

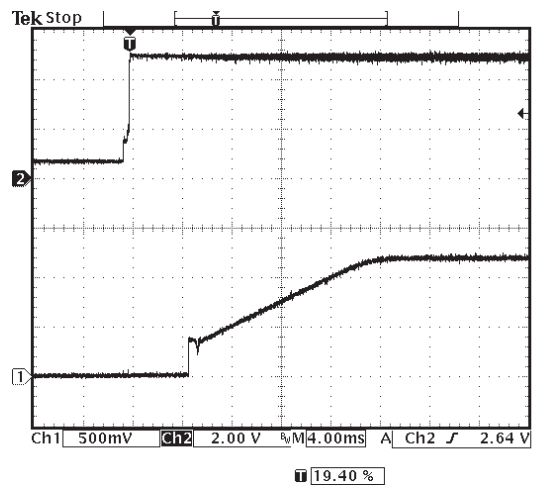


Figure 6: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

S1V2 Model

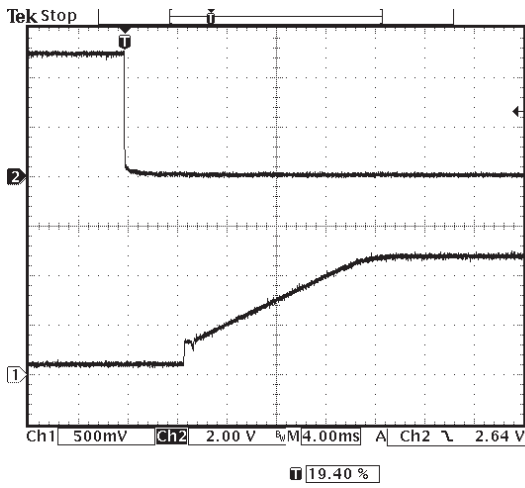


Figure 7: Control On/Off Characteristic (Channel 1: Vo, Channel 2: Remote ON/OFF)

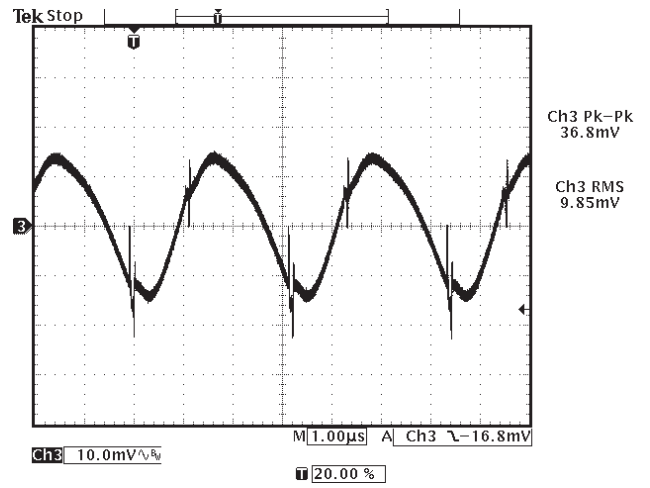


Figure 8: Typical Ripple and Noise (Channel 3: Vo)

S1V5 Model

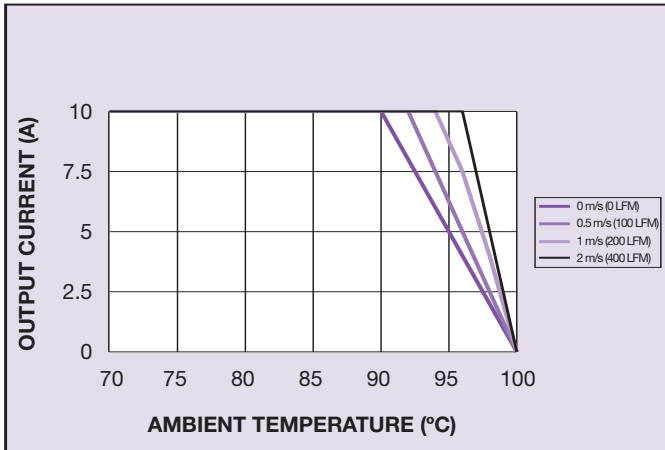


Figure 9: Derating Curve with $V_{in} = 5V$ and $V_{out} = 1.5V$

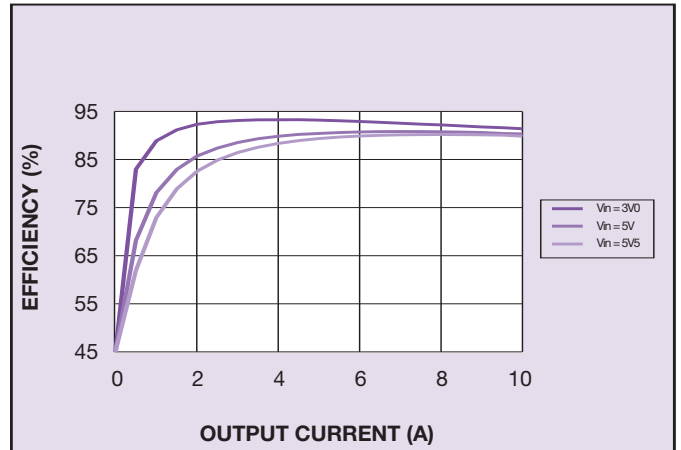


Figure 10: Efficiency vs Load

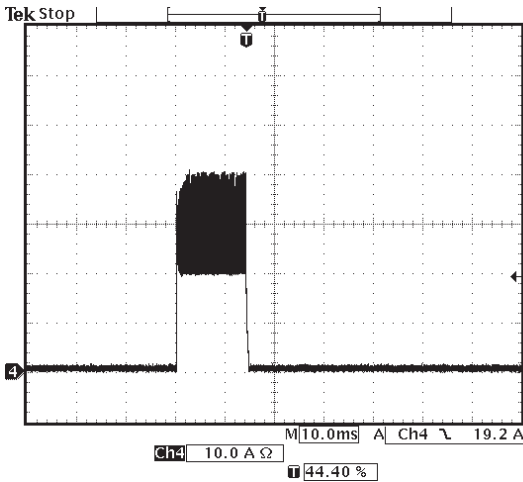


Figure 11: Short Circuit Characteristic (Channel 1: $I_{s/c}$)

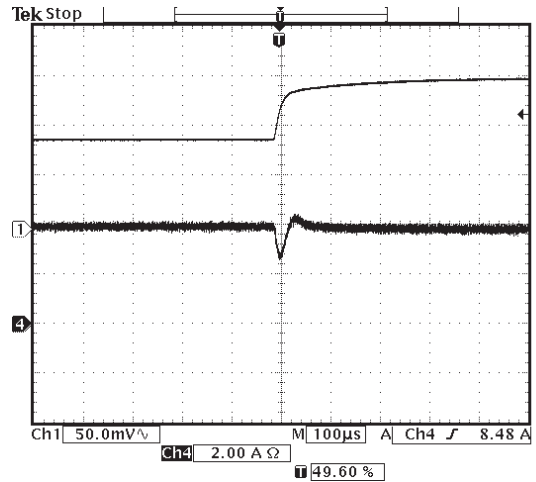


Figure 12: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

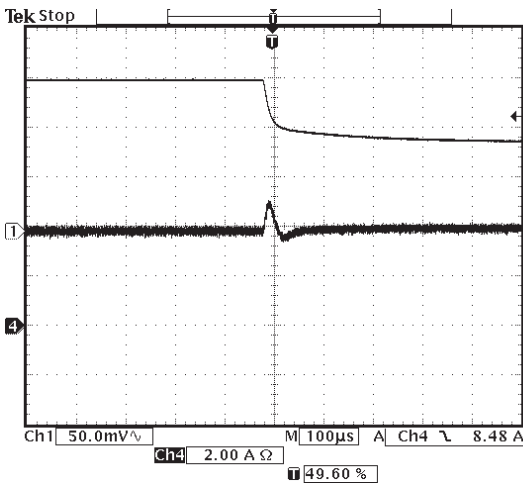


Figure 13: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

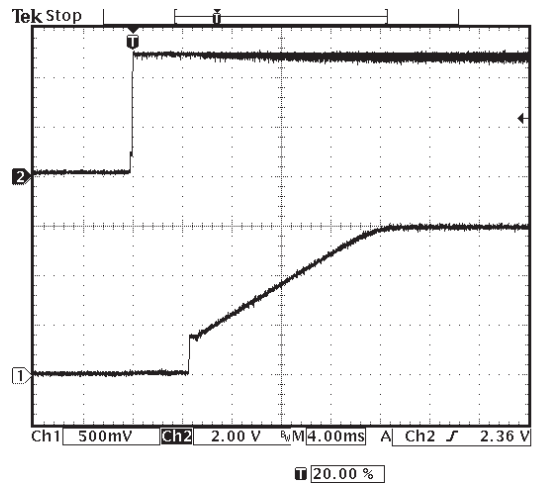


Figure 14: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

S1V5 Model

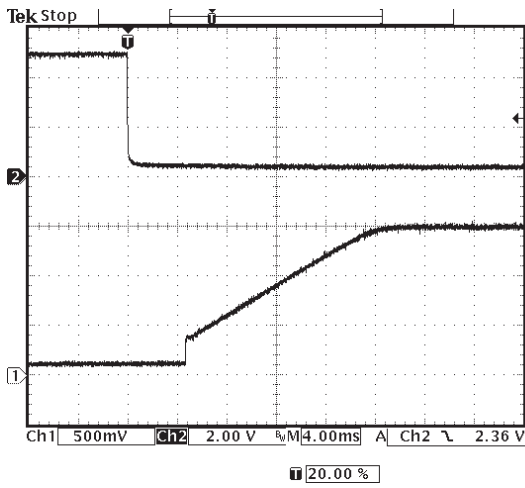


Figure 15: Control On/Off Characteristic (Channel 1: Vo, Channel 2: Remote ON/OFF)

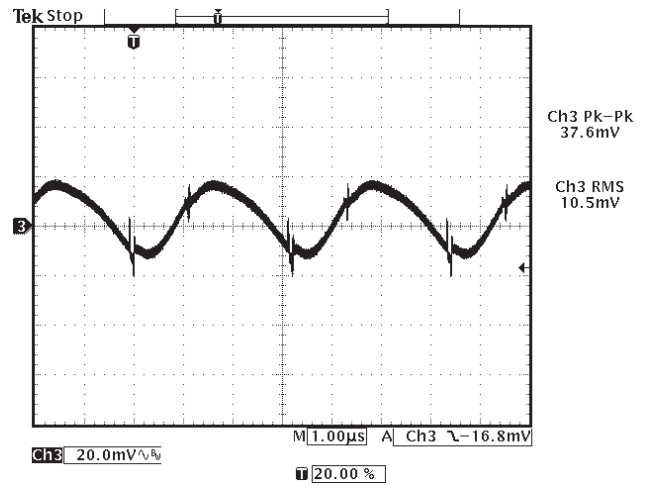


Figure 16: Typical Ripple and Noise (Channel 3: Vo)

S1V8 Model

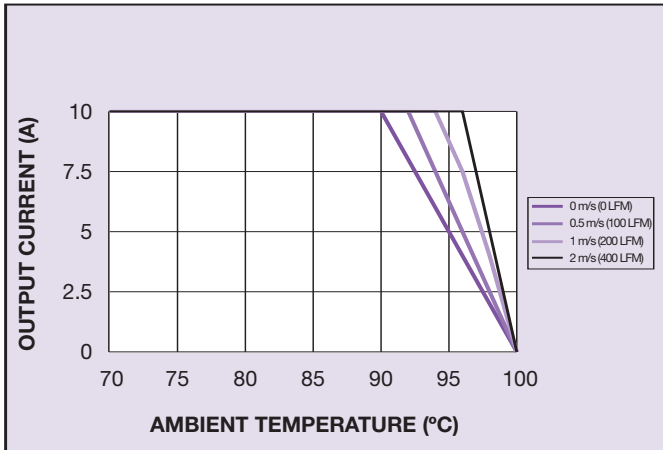


Figure 17: Derating Curve with $V_{in} = 5V$ and $V_{out} = 1.8$

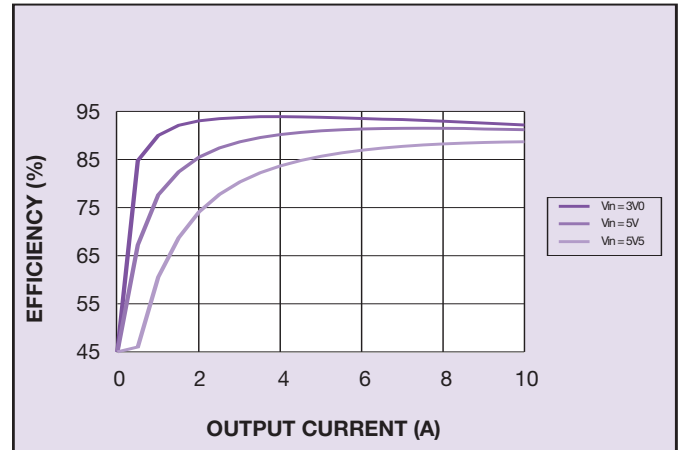


Figure 18: Efficiency vs Load

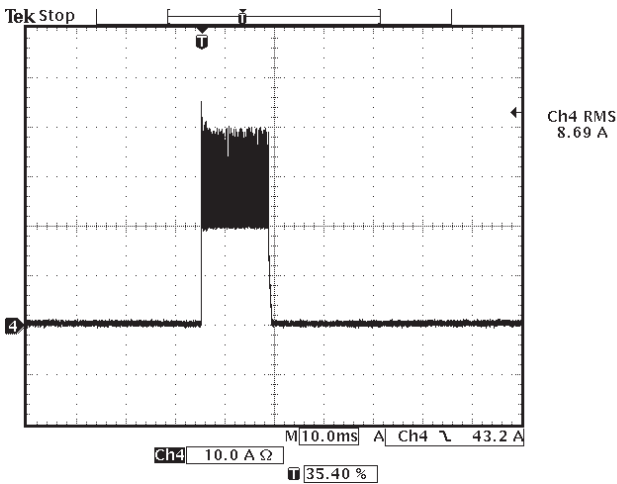


Figure 19: Short Circuit Characteristic (Channel 1: $I_{s/c}$)

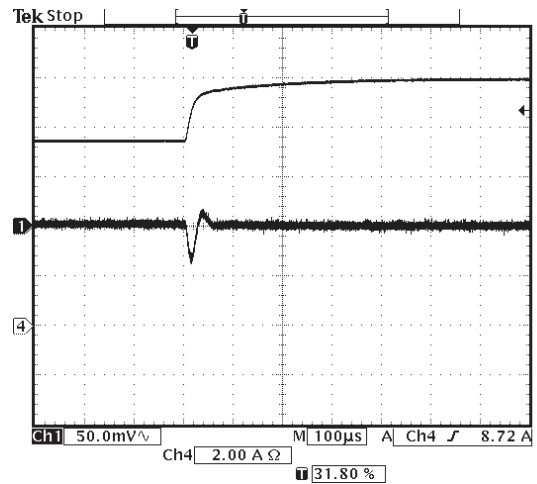


Figure 20: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

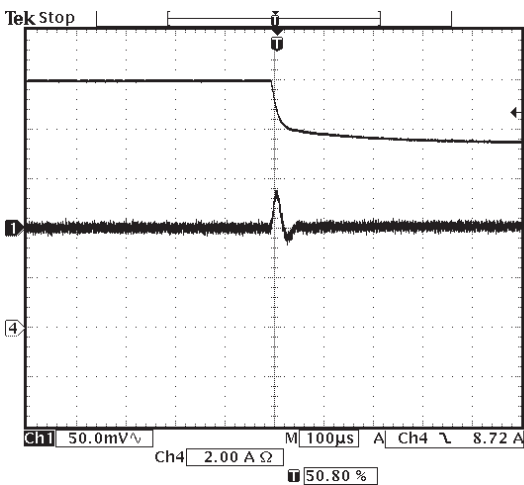


Figure 21: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

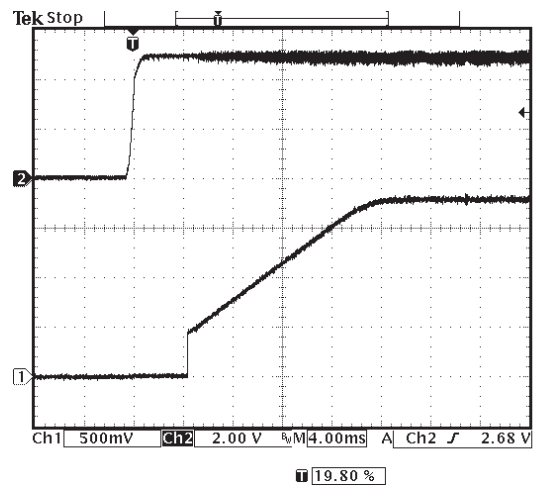


Figure 22: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

S1V8 Model

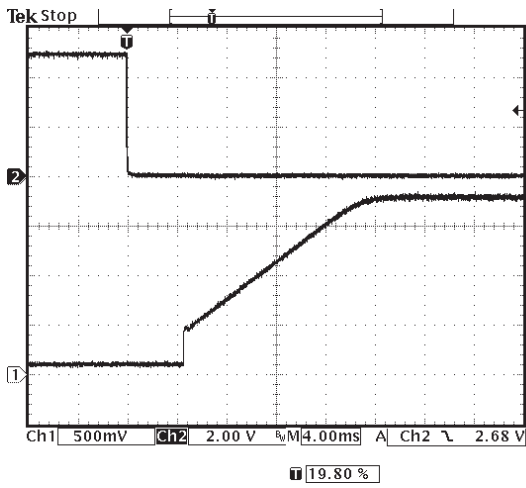


Figure 23: Control On/Off Characteristic (Channel 1: Vo, Channel 2: Remote ON/OFF)

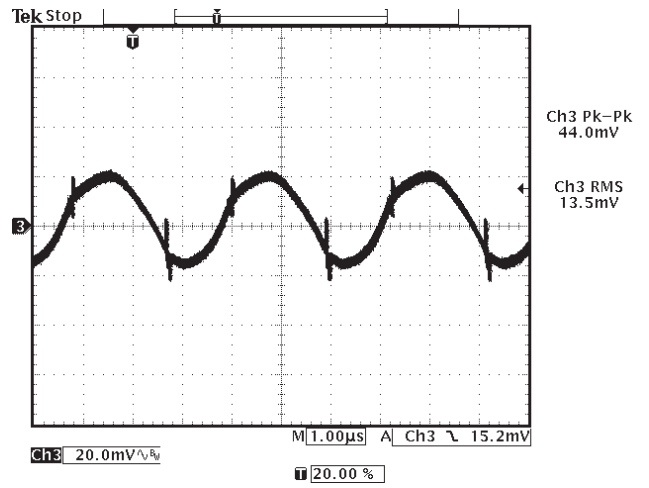


Figure 24: Typical Ripple and Noise (Channel 3: Vo)

S2V5 Model

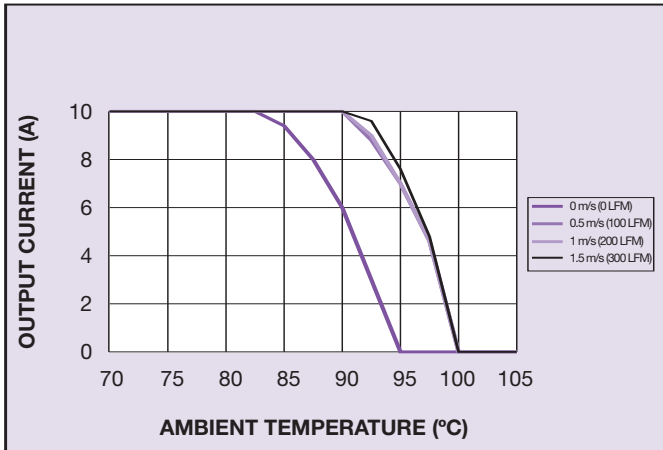


Figure 25: Derating Curve with $V_{in} = 5V$ and $V_{out} = 2.5V$

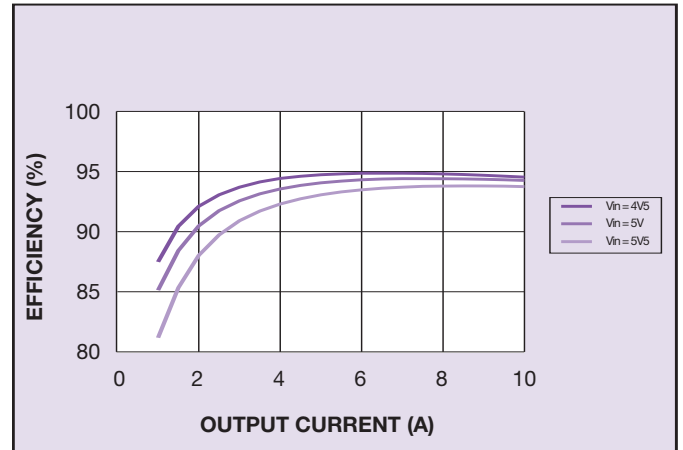


Figure 26: Efficiency vs Load

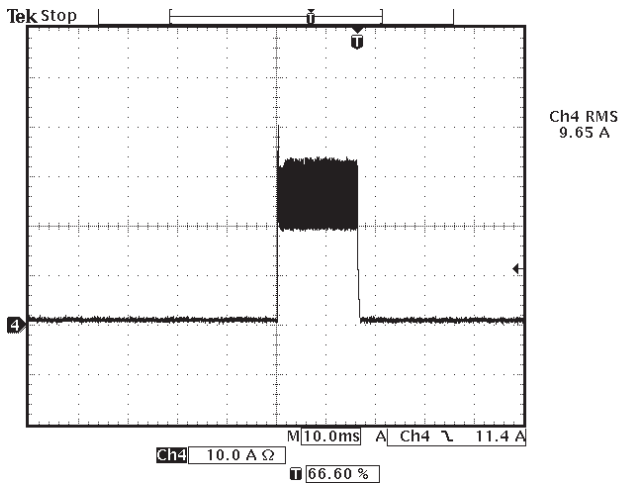


Figure 27: Short Circuit Characteristic (Channel 1: $I_{s/c}$)

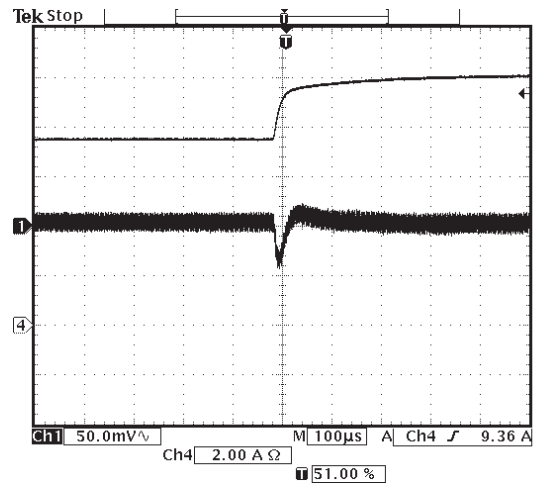


Figure 28: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

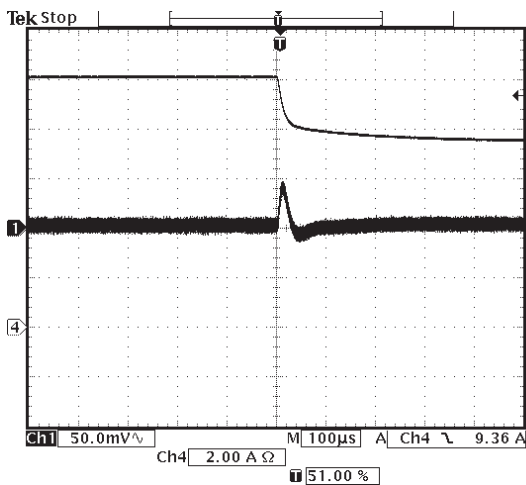


Figure 29: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

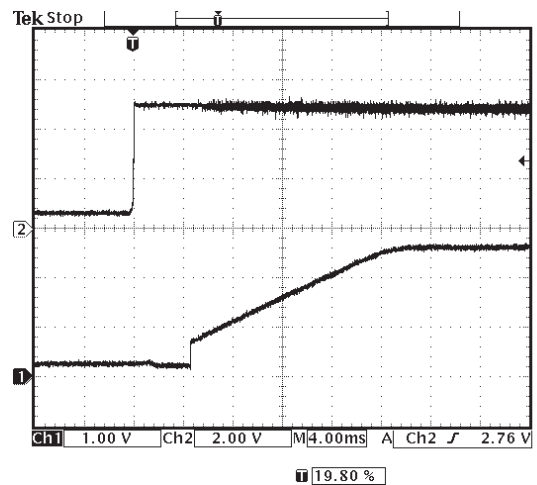


Figure 30: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

S2V5 Model

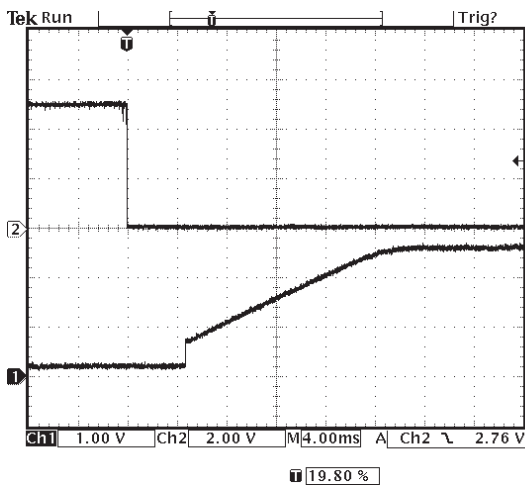


Figure 31: Control On/Off Characteristic (Channel 1: Vo, Channel 2: Remote ON/OFF)

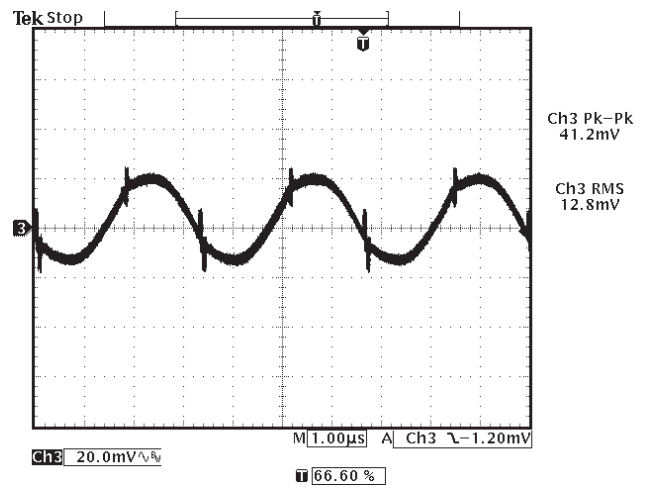


Figure 32: Typical Ripple and Noise (Channel 3: Vo)

S3V3 Model

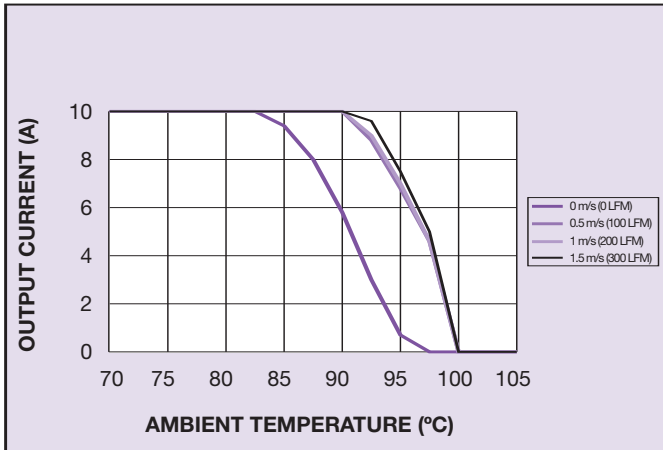


Figure 33: Derating Curve with $V_{in} = 5V$ and $V_{out} = 3.3V$

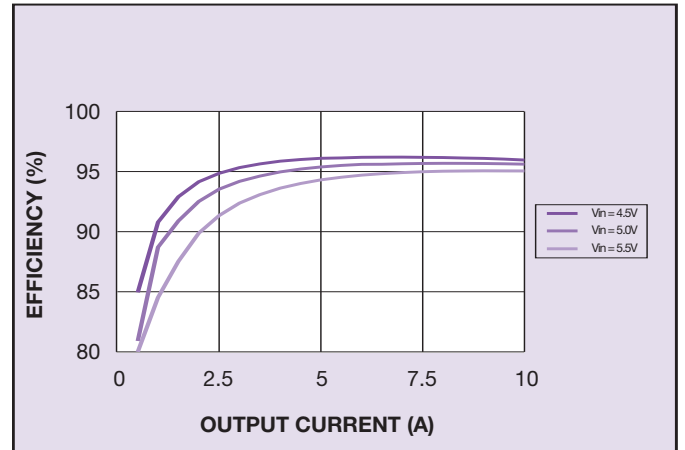


Figure 34: Efficiency vs Load

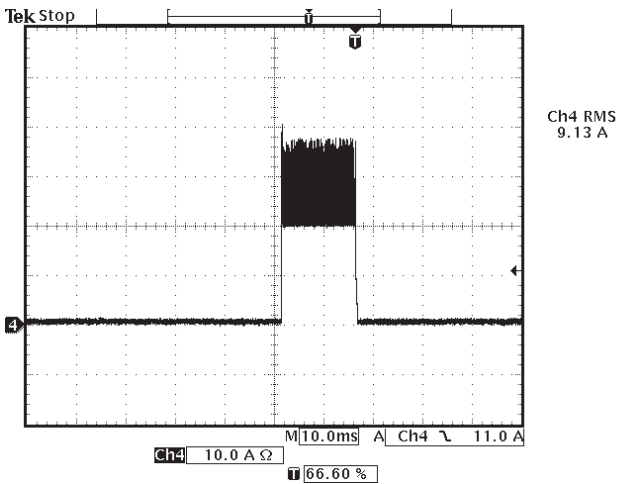


Figure 35: Short Circuit Characteristic (Channel 4: I_o)

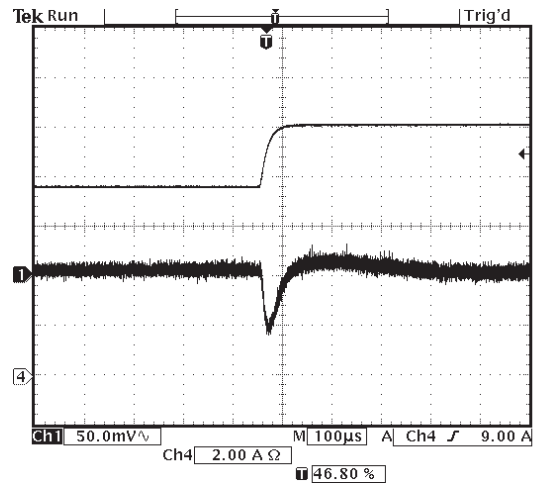


Figure 36: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

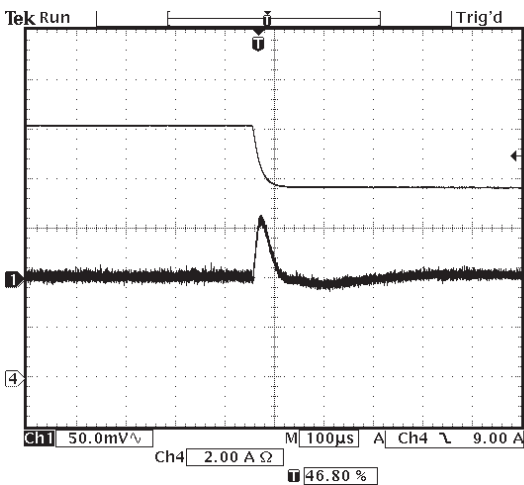


Figure 37: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

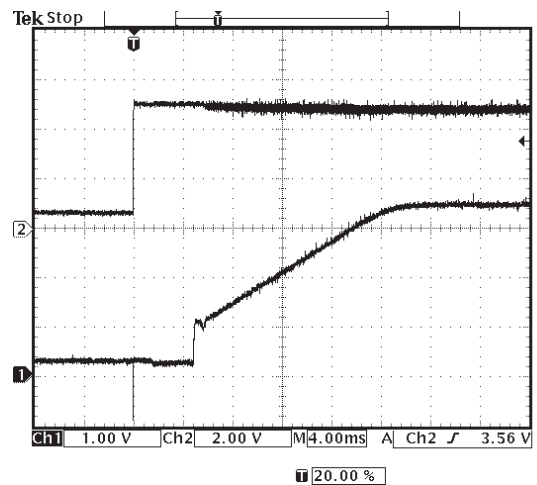


Figure 38: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

S3V3 Model

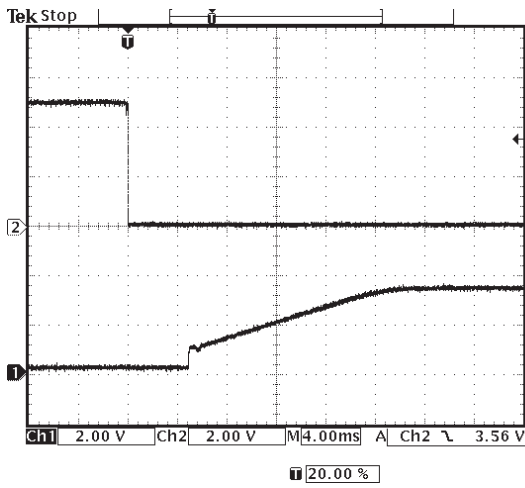


Figure 39: Control On/Off Characteristic
(Channel 1: Vo, Channel 2: Remote ON/OFF)

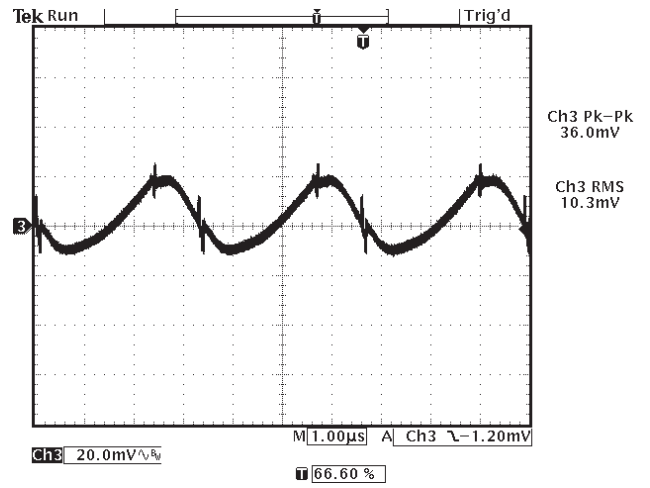


Figure 40: Typical Ripple and Noise
(Channel 3: Vo)

W3V3 Model

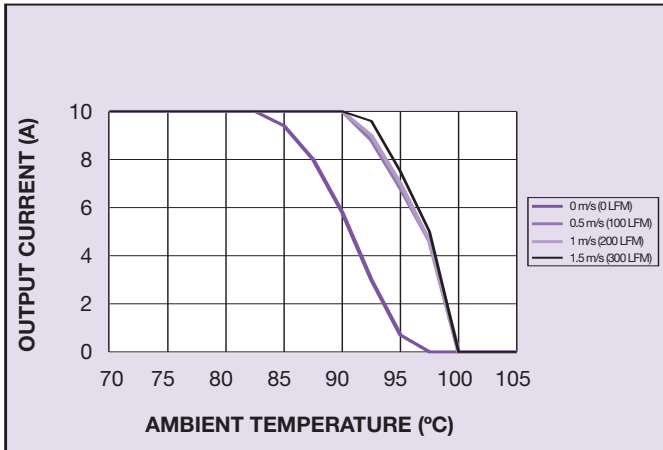


Figure 41: Derating Curve with $V_{in} = 5V$ and $V_{out} = 3.3V$

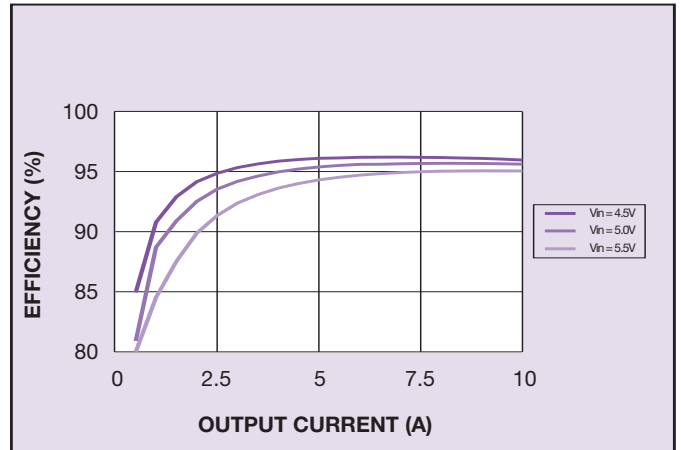


Figure 42: Efficiency vs Load

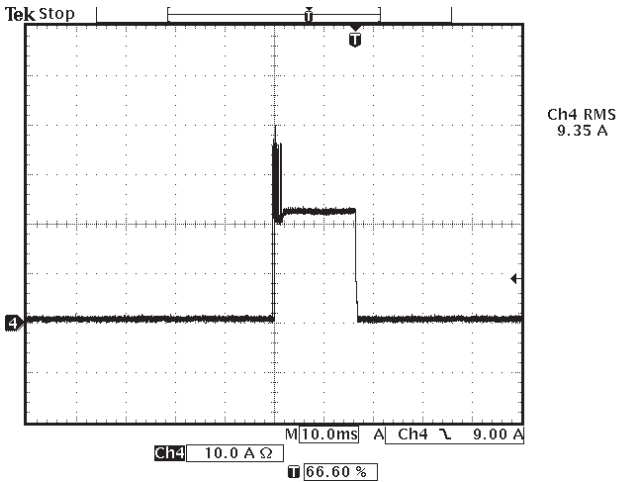


Figure 43: Short Circuit Characteristic (Channel 4: I_o)

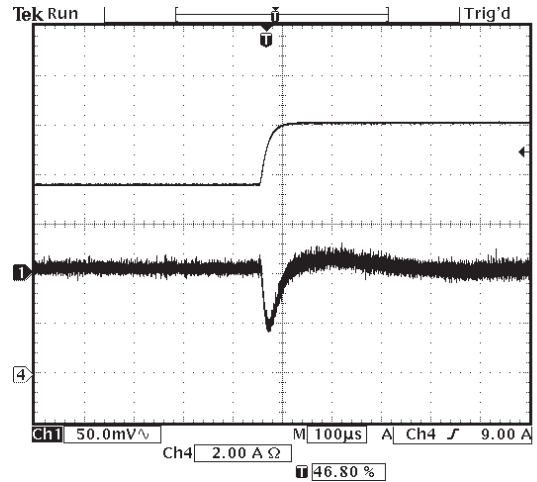


Figure 44: Typical Transient Response 75% - 100% Step Load Change (Channel 1: V_o , Channel 4: I_o)

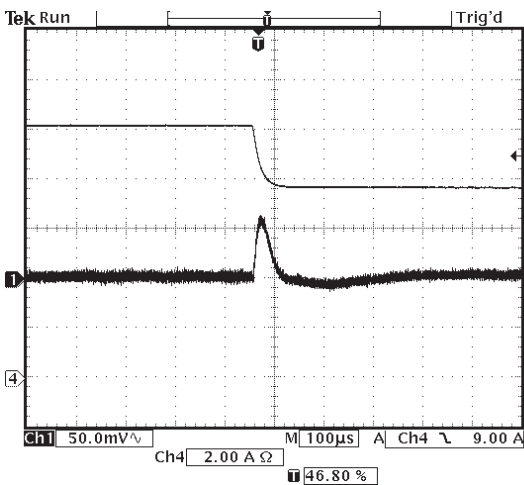


Figure 45: Typical Transient Response 100% - 75% Step Load Change (Channel 1: V_o , Channel 4: I_o)

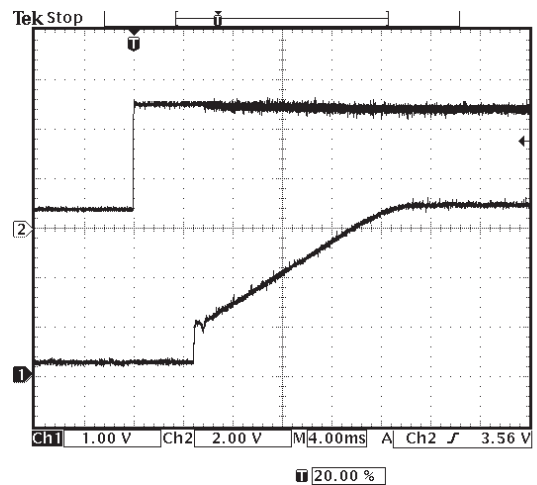


Figure 46: Typical Power-up Characteristic (Channel 1: V_o , Channel 2: V_{in})

WV3 Model

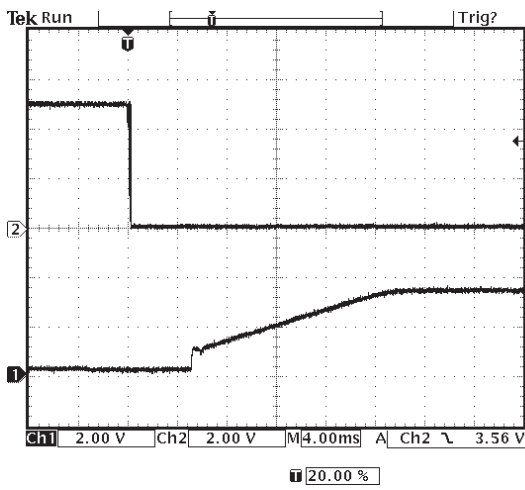


Figure 47: Control On/Off Characteristic
(Channel 1: Vo, Channel 2: Remote ON/OFF)

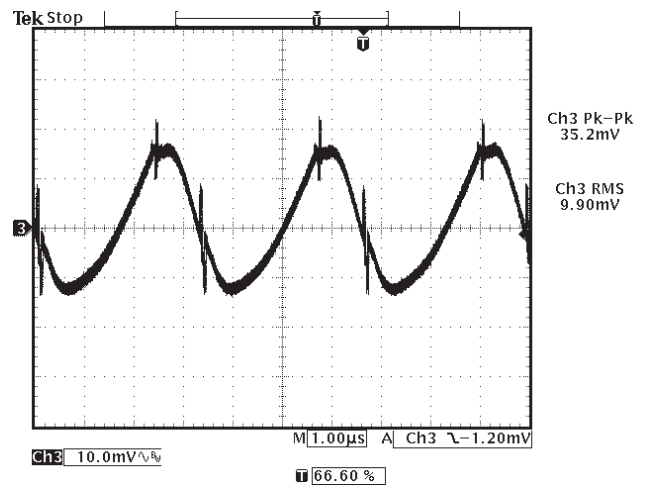
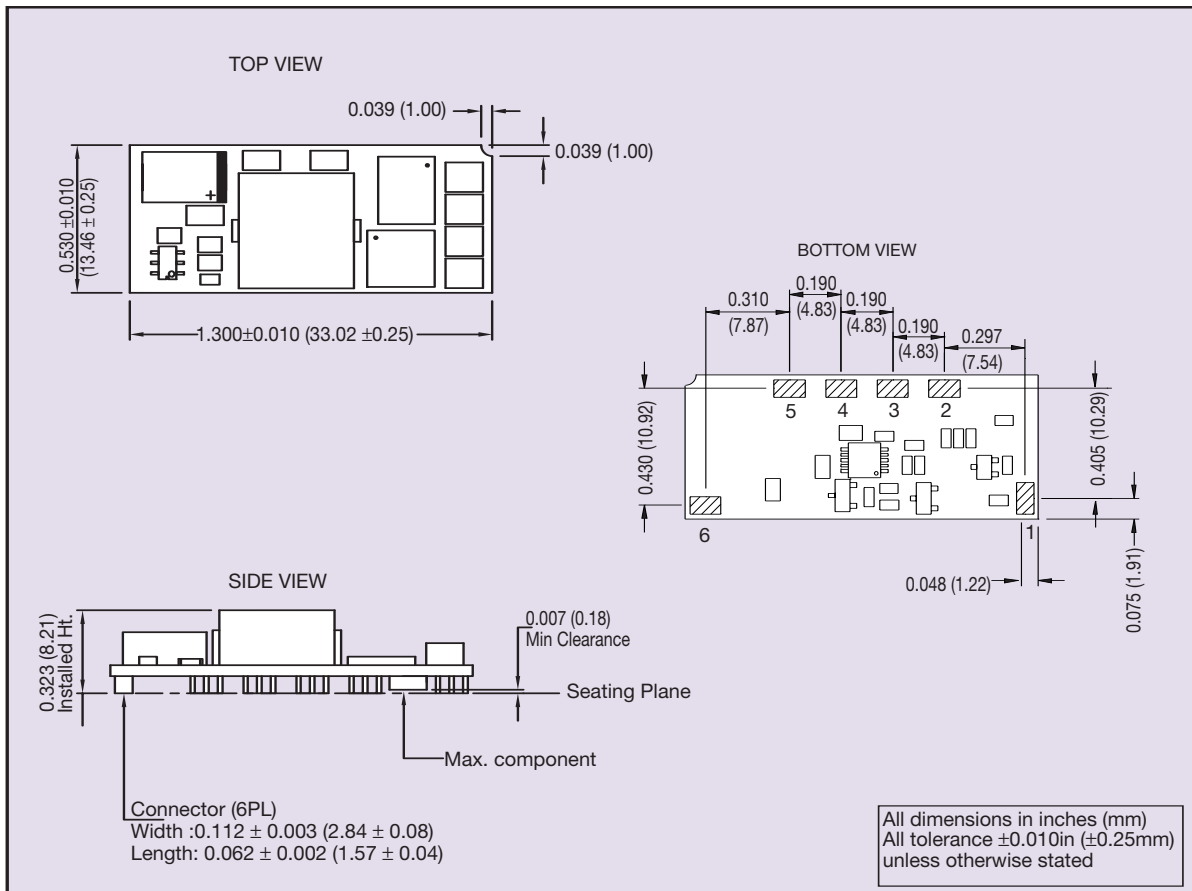


Figure 48: Typical Ripple and Noise
(Channel 3: Vo)



| Pin Connections | |
|-----------------|----------------|
| Pin No. | Function |
| 1 | Remote ON/OFF |
| 2 | Remote Sense + |
| 3 | Trim |
| 4 | +Vout |
| 5 | Ground |
| 6 | +Vin |

Figure 49: Mechanical Drawing and Pinout Table

Note 1

Thermal reference is defined as the highest temperature measured at any one of the specified thermal reference points. See Figure 50: Thermal reference points.

Note 2

The Remote ON/OFF pin is referenced to ground.

Note 3

The SMT10E features a 'Negative Logic' Remote ON/OFF operation. If not using the Remote ON/OFF pin, leave the pin open (the converter will be on). The Remote ON/OFF pin is referenced to ground.

The following conditions apply for the SMT10E:

| Configuration | Converter Operation |
|--|----------------------------|
| Remote pin open circuit | Unit is ON |
| Remote pin pulled low | Unit is ON |
| Remote pin pulled high [Von/off >1.2V] | Unit is OFF |

A 'Positive Logic' Remote ON/OFF version is also possible with this converter. To order please place the suffix '-R' at the end of the model number, e.g. SMT10E-05W3V3-RJ.

Note 4

Thermal reference set up: Unit mounted on an edge card test board 203mm x 190mm. Test board mounted vertically. For test details and recommended set-up see Application Note 168.

CAUTION: Hazardous internal voltages and high temperatures. Ensure that unit is accessible only to trained personnel. The user must provide the recommended fusing in order to comply with safety approvals.

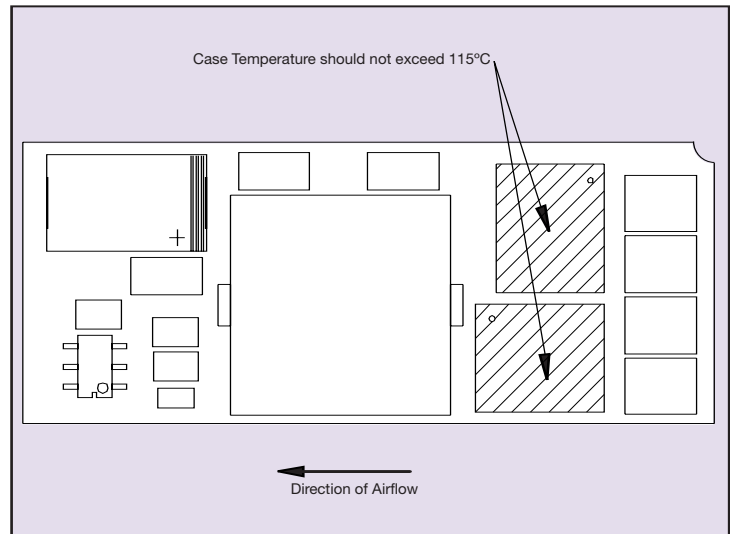


Figure 50: Thermal Reference Points

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