


SERIES: VX78-1000 | DESCRIPTION: NON-ISOLATED DC SWITCHING REGULATOR

FEATURES

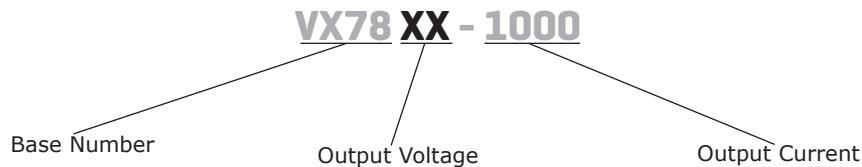
- wide input
- pin-out compatible with linear regulators
- encapsulated
- UL & CSA approved
- high efficiency up to 96%
- no-load input current as low as 0.2 mA
- wide operating temp: -40°C to +85°C
- supports negative output
- short circuit protection on the output

**MODEL**

| | input voltage ¹ | | output voltage (Vdc) | output current max (mA) | output power max (W) | ripple & noise ² max (mVp-p) | efficiency ³ typ (%) |
|--------------|----------------------------|----------------|-------------------------|-------------------------------|----------------------------|---|---------------------------------------|
| | typ (Vdc) | range (Vdc) | | | | | |
| VX7803-1000 | 24 | 6~36 | 3.3 | 1000 | 3.3 | 75 | 90 |
| VX7805-1000 | 24 | 8~36 | 5 | 1000 | 5 | 75 | 93 |
| | 12 | 8~27 | -5 | -500 | 2.5 | 75 | 86 |
| VX78039-1000 | 24 | 13~36 | 9 | 1000 | 9 | 75 | 95 |
| VX78012-1000 | 24 | 16~36 | 12 | 1000 | 12 | 75 | 96 |
| | 12 | 8~20 | -12 | -300 | 3.6 | 75 | 89 |
| VX7815-1000 | 24 | 20~36 | 15 | 1000 | 15 | 75 | 96 |
| | 12 | 8~18 | -15 | -300 | 4.5 | 75 | 89 |

Notes:

1. For input voltages higher than 30 Vdc, a 22 µF / 50 V input capacitor is required.
2. Tested at nominal input, 20~100% load, 20 MHz bandwidth, with 10 µF electrolytic and 1 µF ceramic capacitor on the output. At loads below 20%, the max ripple and noise of the 3.3 & 5 Vdc outputs will be 100 mVp-p, and the other outputs will be 2% Vo.
3. Measured at min Vin, full load.
4. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY

INPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|--|--------|----------|----------|------------|
| operating input voltage ¹ | for positive output applications for negative output applications | 6 8 | 24 12 | 36 27 | Vdc Vdc |
| filter | capacitor filter | | | | |
| input reverse polarity protection | no | | | | |
| no-load input current | positive outputs | | 0.1 | 1 | mA |

Note: 1. See Model section on page 1 for specific input voltage ranges.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|--|------------|------------|------------|------------|
| maximum capacitive load ² | for positive output applications for negative output applications | | | 680 330 | µF µF |
| voltage accuracy | at full load, input voltage range 3.3 Vdc output model all other models | | ±2 ±2 | ±4 ±3 | % % |
| line regulation | at full load, input voltage range | | ±0.2 | ±0.4 | % |
| load regulation | at nominal input, 10~100% load | | ±0.4 | ±0.6 | % |
| switching frequency | at nominal input voltage, full load 3.3/5 Vdc output models all other models | 420 580 | 520 680 | 620 780 | kHz kHz |
| transient recovery time | at nominal input voltage, 25% load step change | | 0.1 | 1 | ms |
| transient response deviation | at nominal input voltage, 25% load step change | | 50 | 300 | mV |
| temperature coefficient | at full load | | | ±0.03 | %/°C |

Note: 2. The maximum capacitive load was tested at nominal input voltage, full load.

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| short circuit protection | continuous, auto recovery | | | | |

SAFETY AND COMPLIANCE

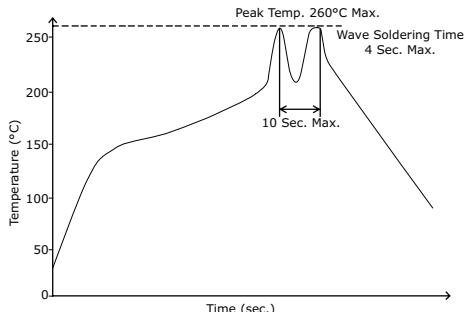
| parameter | conditions/description | min | typ | max | units |
|---------------------|---|-----------|-----|-----|-------|
| safety approvals | UL 60950-1 | | | | |
| EMI/EMC | EN 55032, EN 55024 | | | | |
| conducted emissions | CISPR22/EN55022, class B (external circuit required, see Figure 4-b) | | | | |
| radiated emissions | CISPR22/EN55022, class B (external circuit required, see Figure 4-b) | | | | |
| ESD | IEC/EN61000-4-2, contact ± 4kV, class B | | | | |
| radiated immunity | IEC/EN61000-4-3, 10V/m, class A | | | | |
| EFT/burst | IEC/EN61000-4-4, ± 1kV, class B (external circuit required, see Figure 4-a) | | | | |
| surge | IEC/EN61000-4-5, line-line ± 1kV, class B (external circuit required, see Figure 4-a) | | | | |
| conducted immunity | IEC/EN61000-4-6, 3 Vr.m.s, class A | | | | |
| MTBF | as per MIL-HDBK-217F, 25°C | 2,000,000 | | | hours |
| RoHS | 2011/65/EU | | | | |

ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |

SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|----------------|----------------------------|-----|-----|-----|-------|
| wave soldering | see wave soldering profile | | | 260 | °C |

**MECHANICAL**

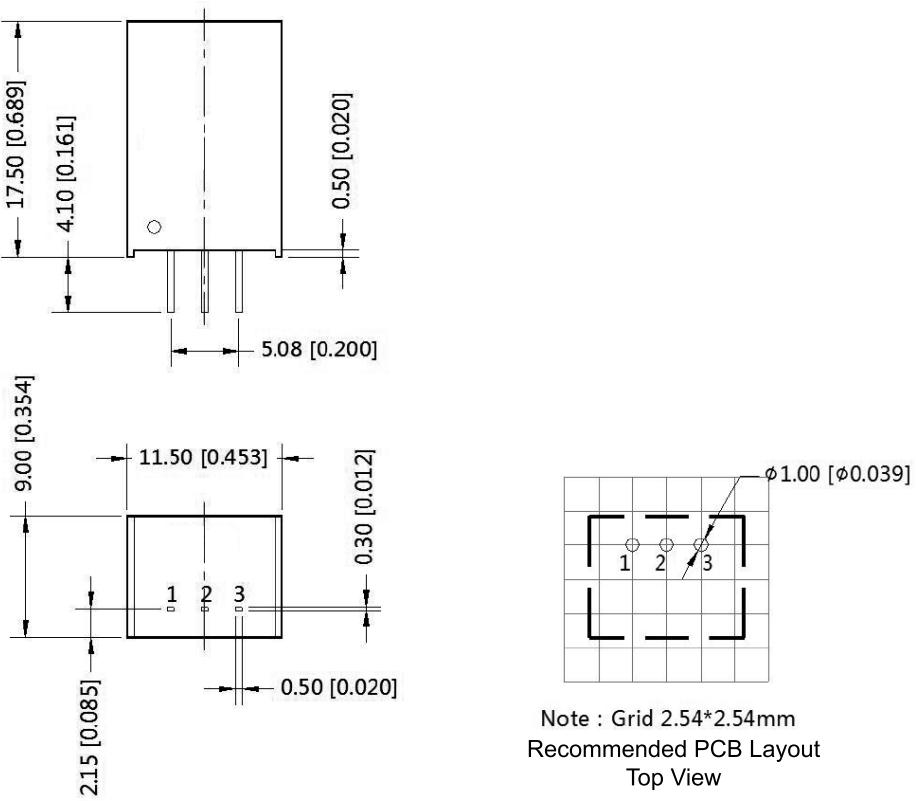
| parameter | conditions/description | min | typ | max | units |
|---------------|--|-----|-----|-----|-------|
| dimensions | 11.50 x 9.00 x 17.50 [0.453 x 0.354 x 0.689 inch] | | | | mm |
| case material | black flame-retardant heat-proof plastic (UL94V-0) | | | | |
| weight | | | | 3.8 | g |

MECHANICAL DRAWING

units: mm [inch]

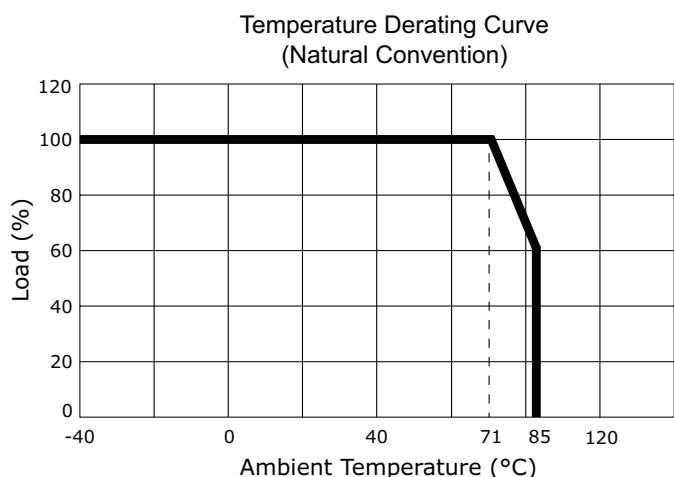
tolerance: ± 0.25 [± 0.010]pin diameter tolerance: ± 0.10 [± 0.004]

| PIN CONNECTIONS | | |
|-----------------|---------|---------|
| PIN | +OUTPUT | -OUTPUT |
| 1 | +VIN | +VIN |
| 2 | GND | -VOUT |
| 3 | +VOUT | GND |

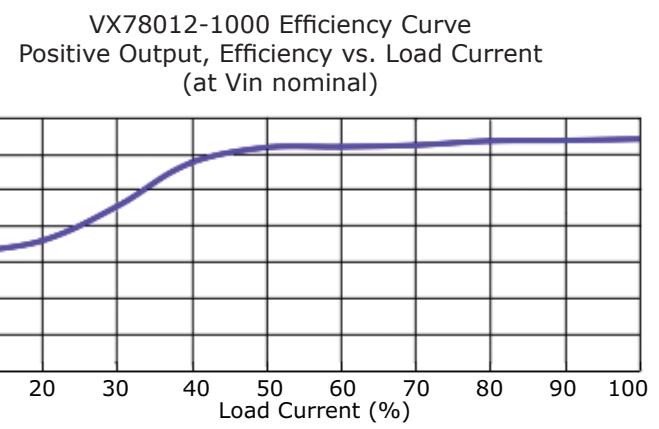
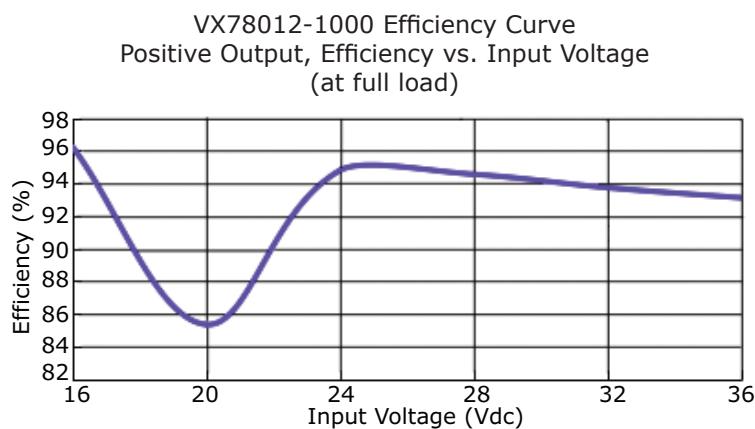
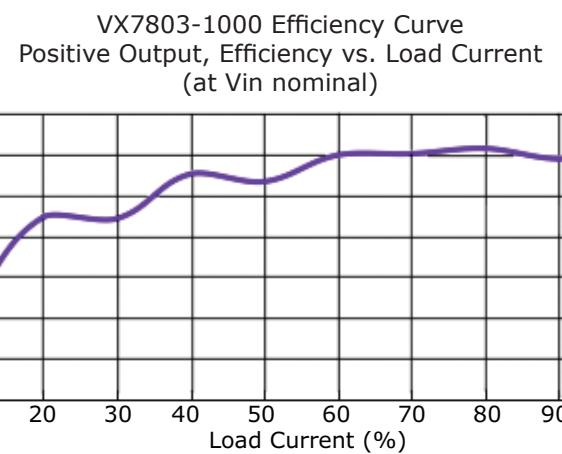
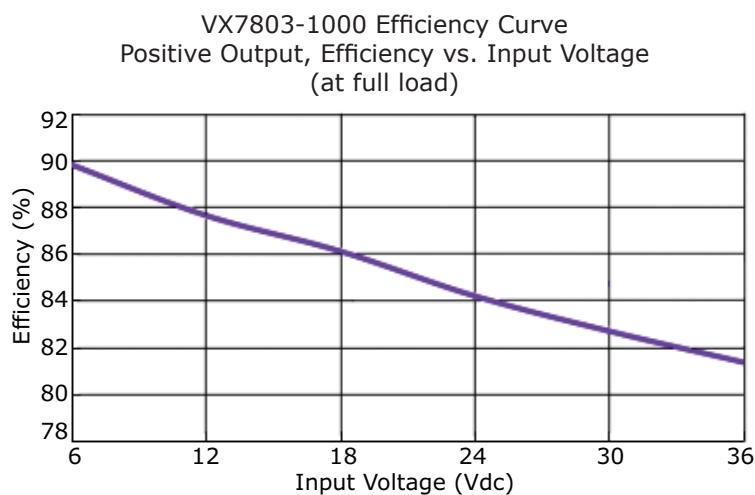


Note : Grid 2.54*2.54mm
Recommended PCB Layout
Top View

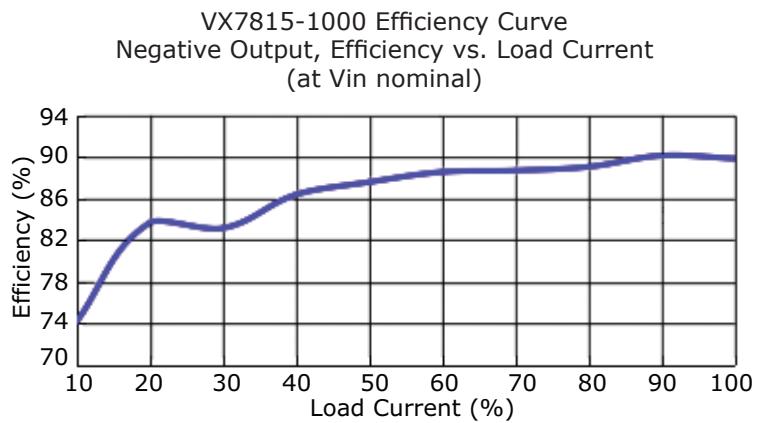
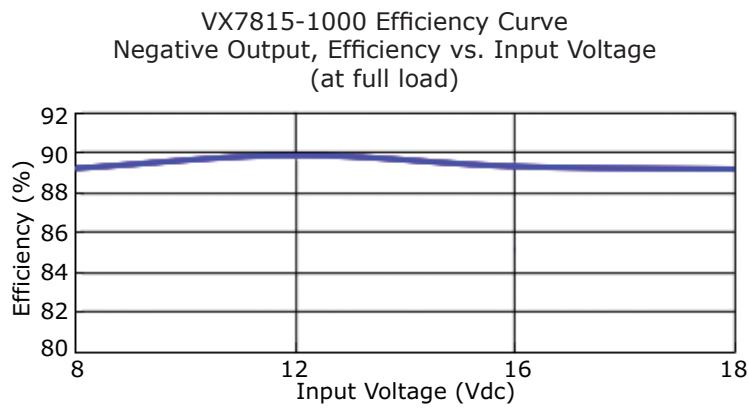
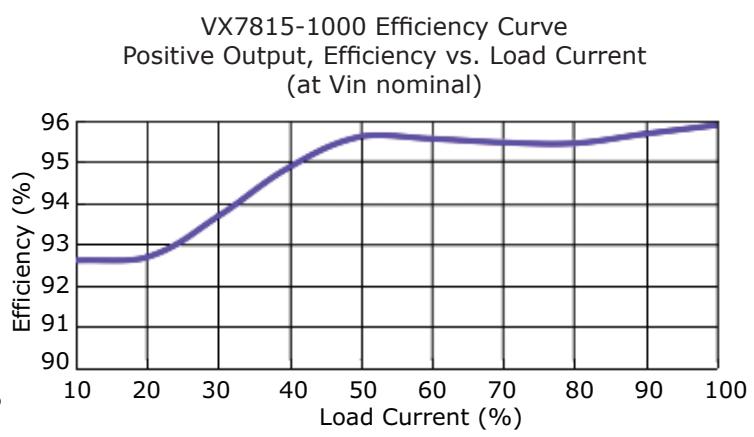
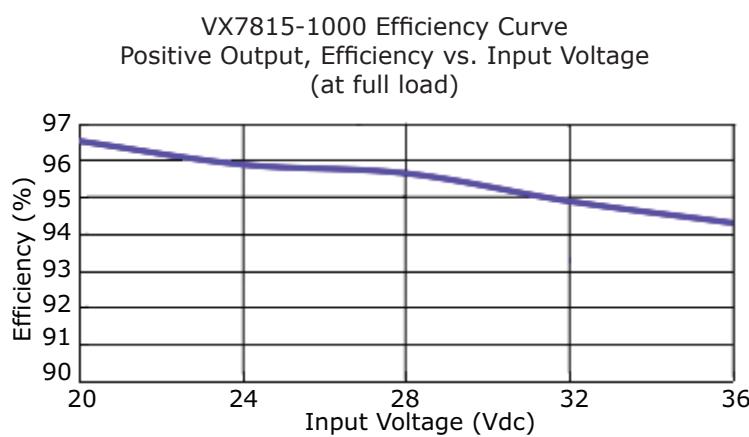
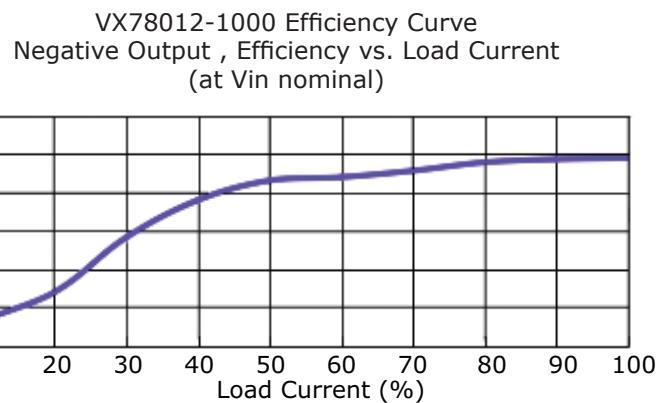
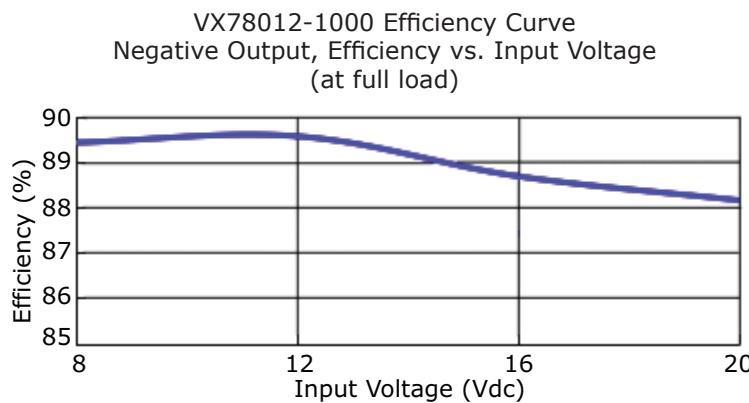
DERATING CURVE



EFFICIENCY CURVES



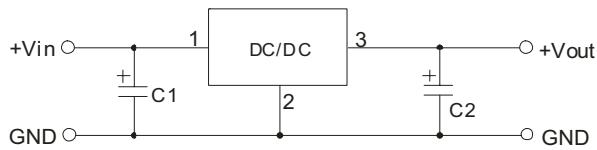
EFFICIENCY CURVES (CONTINUED)



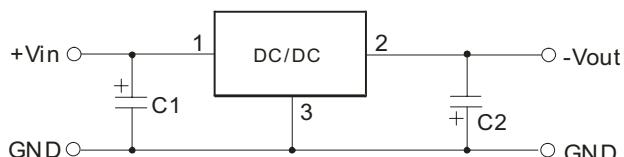
TYPICAL APPLICATION CIRCUIT

Figure 1

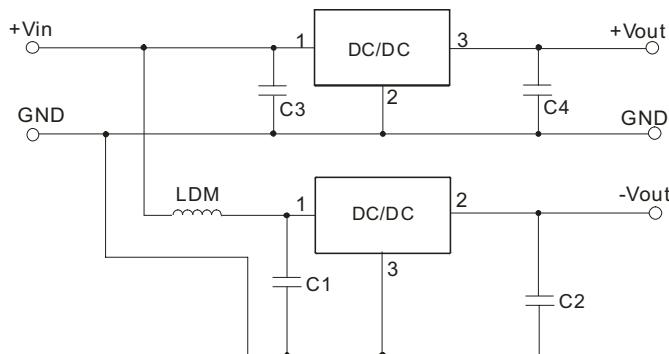
Positive Output Application Circuit

**Figure 2**

Negative Output Application Circuit

**Figure 3**

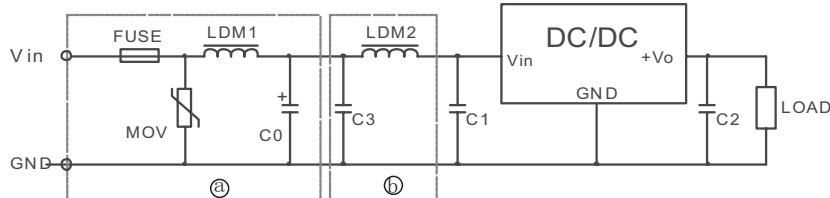
Positive and Negative Output Paralleling Application Circuit

**Table 1**

External Capacitor Table

| Model Number | C1, C3 (ceramic capacitor) | C2, C4 (ceramic capacitor) |
|--------------|-------------------------------|-------------------------------|
| VX7803-1000 | 10 μ F/50 V | 22 μ F/10 V |
| VX7805-1000 | 10 μ F/50 V | 22 μ F/10 V |
| VX78039-1000 | 10 μ F/50 V | 22 μ F/16 V |
| VX78012-1000 | 10 μ F/50 V | 22 μ F/25 V |
| VX7815-1000 | 10 μ F/50 V | 22 μ F/25 V |

EMC RECOMMENDED CIRCUIT

Figure 4**Table 2**

| Recommended external circuit components | |
|---|--|
| FUSE | choose according to actual input current |
| MOV | S20K30 |
| LDM1 | 82 μ H |
| C0 | 680 μ F/50 V |
| C1, C2 | see Table 1 |
| C3 | 4.7 μ F/50 V |
| LDM2 | 12 μ H |

Note:

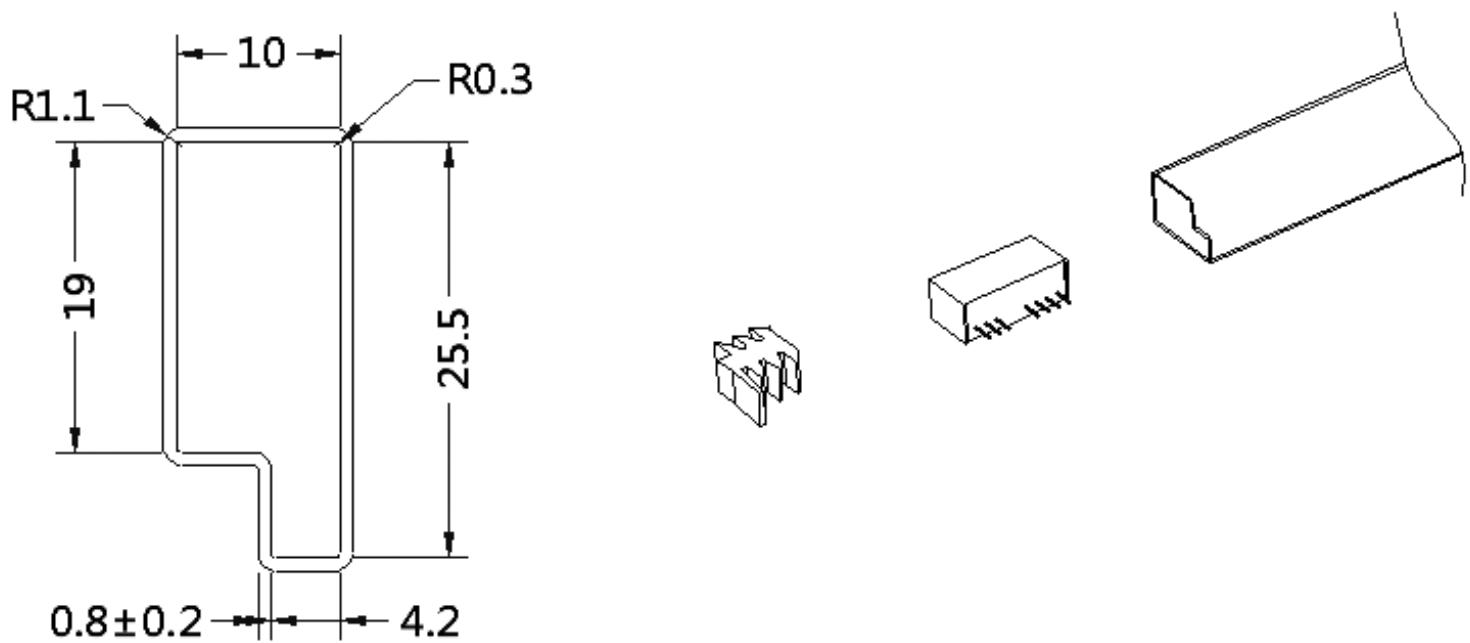
1. C1 & C2 (C3 & C4) are required and should be connected as close to the module pins as possible.
2. To reduce the output ripple further, C2 & C4 can be increased as needed and the use of tantalum or low ESR electrolytic capacitors would be recommended.
3. When using application circuit in Figure 3, a 10 μ H LDM component is recommended to reduce the interference.

PACKAGING

units: mm

Tube Size: 11.6 x 27.1 x 530 mm

QTY: 44 pcs



REVISION HISTORY

| rev. | description | date |
|------|-----------------|------------|
| 1.0 | initial release | 05/18/2017 |

The revision history provided is for informational purposes only and is believed to be accurate.



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