

NTGS3441, NVGS3441

Power MOSFET

1 Amp, 20 Volts, P-Channel TSOP-6



ON Semiconductor®

<http://onsemi.com>

1 AMPERE
20 VOLTS
 $R_{DS(on)} = 90 \text{ m}\Omega$

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP-6 Surface Mount Package
- NV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Applications

- Power Management in Portable and Battery-Powered Products, i.e.: Cellular and Cordless Telephones, and PCMCIA Cards

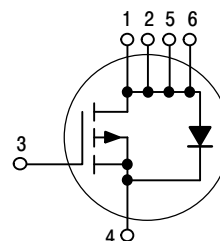
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|-----------------|------------|--------------------|
| Drain-to-Source Voltage | V_{DSS} | -20 | V |
| Gate-to-Source Voltage – Continuous | V_{GS} | ± 8.0 | V |
| Thermal Resistance Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 244 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_d | 0.5 | W |
| Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ | I_D | -1.65 | A |
| – Pulsed Drain Current ($T_p < 10 \mu\text{s}$) | I_{DM} | -10 | A |
| Thermal Resistance Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 128 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_d | 1.0 | W |
| Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ | I_D | -2.35 | A |
| – Pulsed Drain Current ($T_p < 10 \mu\text{s}$) | I_{DM} | -14 | A |
| Thermal Resistance Junction-to-Ambient (Note 3) | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_d | 2.0 | W |
| Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ | I_D | -3.3 | A |
| – Pulsed Drain Current ($T_p < 10 \mu\text{s}$) | I_{DM} | -20 | A |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ |
| Maximum Lead Temperature for Soldering Purposes for 10 Seconds | T_L | 260 | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Minimum FR-4 or G-10 PCB, operating to steady state.
2. Mounted onto a 2" square FR-4 board (1 in sq, 2 oz. Cu. 0.06" thick single sided), operating to steady state.
3. Mounted onto a 2" square FR-4 board (1 in sq, 2 oz. Cu. 0.06" thick single sided), $t < 5.0$ seconds.

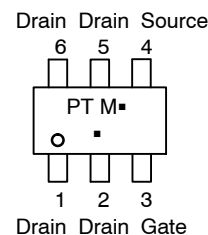
P-Channel



MARKING DIAGRAM & PIN ASSIGNMENT



TSOP-6
CASE 318G
STYLE 1



PT = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|---------------------|--------------------|
| NTGS3441T1G | TSOP-6 (Pb-Free) | 3000 / Tape & Reel |
| NVGS3441T1G | TSOP-6 (Pb-Free) | 3000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NTGS3441, NVGS3441

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Notes 4 & 5)

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|---|---|---------------------|----------------|----------------|------|-----|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = -10 μA) | V _{(BR)DSS} | -20 | - | - | Vdc | |
| Zero Gate Voltage Drain Current (V _{GS} = 0 Vdc, V _{DS} = -20 Vdc, T _J = 25°C) (V _{GS} = 0 Vdc, V _{DS} = -20 Vdc, T _J = 70°C) | I _{DSS} | - | - | -1.0 -5.0 | μAdc | |
| Gate-Body Leakage Current (V _{GS} = -8.0 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | - | - | -100 | nAdc | |
| Gate-Body Leakage Current (V _{GS} = +8.0 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | - | - | 100 | nAdc | |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = -250 μAdc) | V _{GS(th)} | -0.45 | -1.05 | -1.50 | Vdc | |
| Static Drain-Source On-State Resistance (V _{GS} = -4.5 Vdc, I _D = -3.3 Adc) (V _{GS} = -2.5 Vdc, I _D = -2.9 Adc) | R _{DS(on)} | - | 0.069 0.117 | 0.090 0.135 | Ω | |
| Forward Transconductance (V _{DS} = -10 Vdc, I _D = -3.3 Adc) | g _{FS} | - | 6.8 | - | Mhos | |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | (V _{DS} = -5.0 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{ISS} | - | 480 | - | pF |
| Output Capacitance | | C _{OSS} | - | 265 | - | pF |
| Reverse Transfer Capacitance | | C _{RSS} | - | 100 | - | pF |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | (V _{DD} = -20 Vdc, I _D = -1.6 Adc, V _{GS} = -4.5 Vdc, R _g = 6.0 Ω) | t _{d(on)} | - | 13 | 25 | ns |
| Rise Time | | t _r | - | 23.5 | 45 | ns |
| Turn-Off Delay Time | | t _{d(off)} | - | 27 | 50 | ns |
| Fall Time | | t _f | - | 24 | 45 | ns |
| Total Gate Charge | (V _{DS} = -10 Vdc, V _{GS} = -4.5 Vdc, I _D = -3.3 Adc) | Q _{tot} | - | 6.2 | 14 | nC |
| Gate-Source Charge | | Q _{gs} | - | 1.3 | - | nC |
| Gate-Drain Charge | | Q _{gd} | - | 2.5 | - | nC |
| BODY-DRAIN DIODE RATINGS | | | | | | |
| Diode Forward On-Voltage | (I _S = -1.6 Adc, V _{GS} = 0 Vdc) | V _{SD} | - | -0.88 | -1.2 | Vdc |
| Diode Forward On-Voltage | (I _S = -3.3 Adc, V _{GS} = 0 Vdc) | V _{SD} | - | -0.98 | - | Vdc |
| Reverse Recovery Time | (I _S = -1.6 Adc, dI _S /dt = 100 A/μs) | t _{rr} | - | 30 | 60 | ns |

4. Indicates Pulse Test: P.W. = 300 μsec max, Duty Cycle = 2%.

5. Handling precautions to protect against electrostatic discharge are mandatory.

TYPICAL ELECTRICAL CHARACTERISTICS

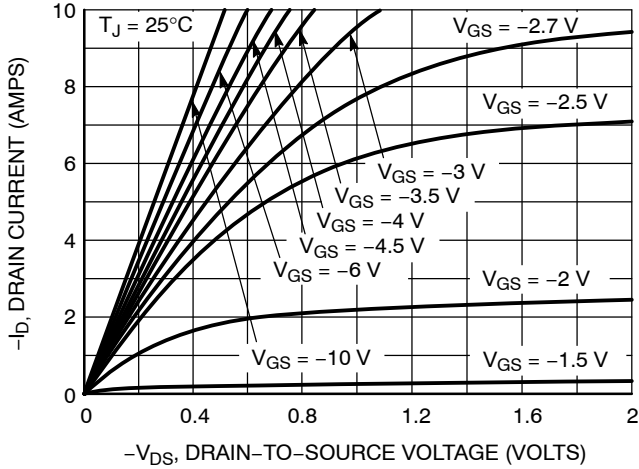


Figure 1. On-Region Characteristics

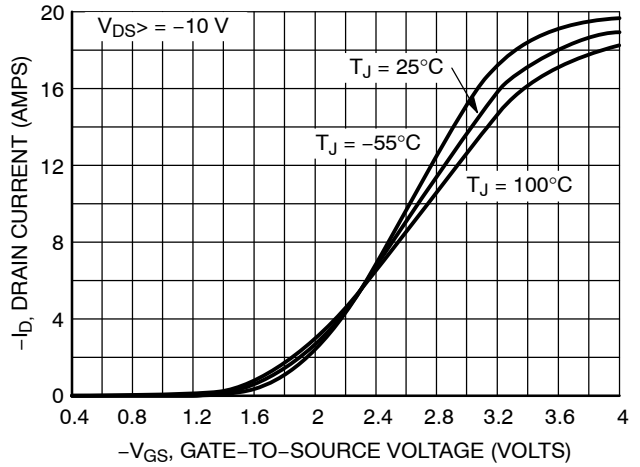


Figure 2. Transfer Characteristics

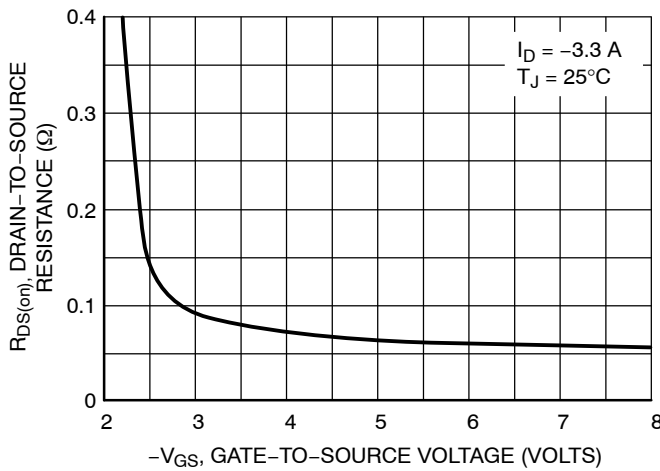


Figure 3. On-Resistance vs. Gate-to-Source Voltage

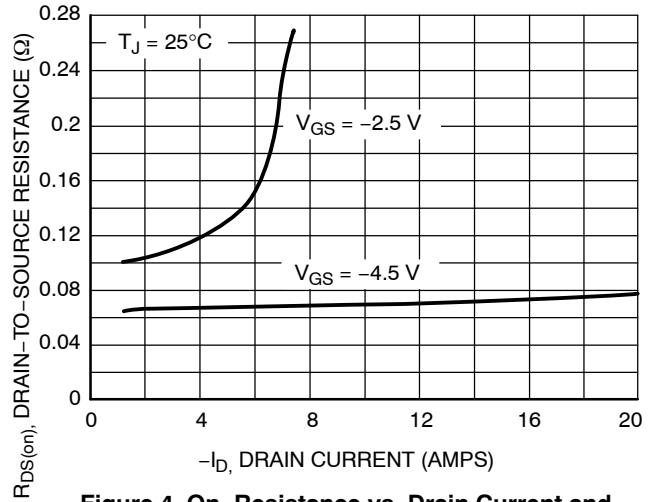


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

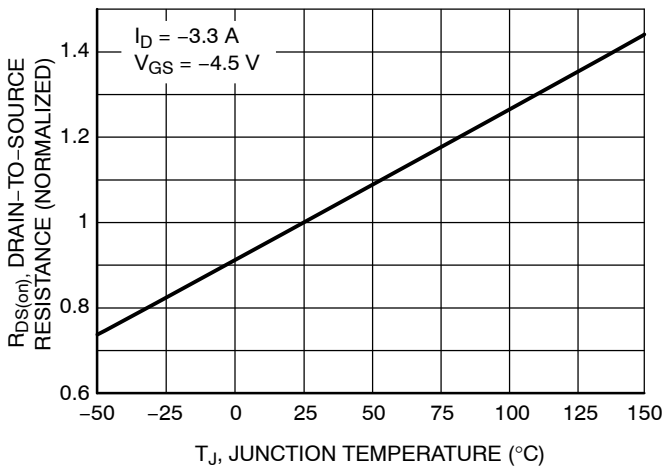


Figure 5. On-Resistance Variation with Temperature

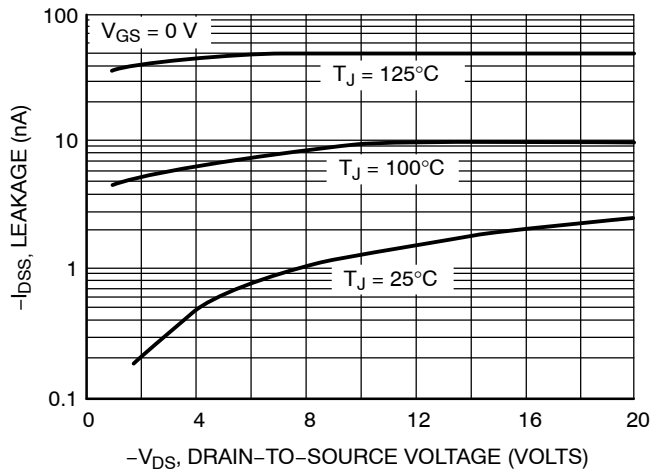
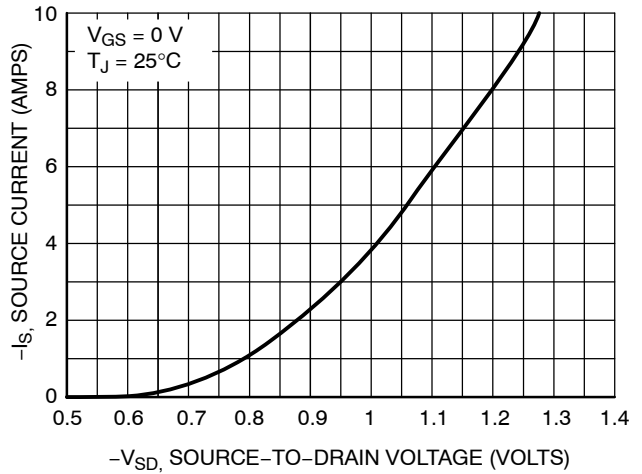
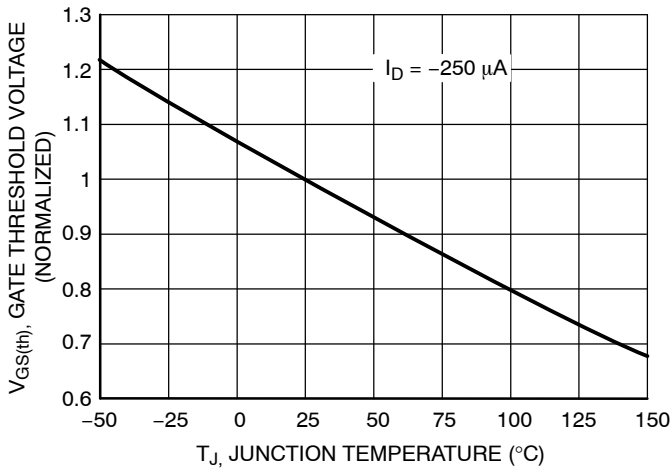
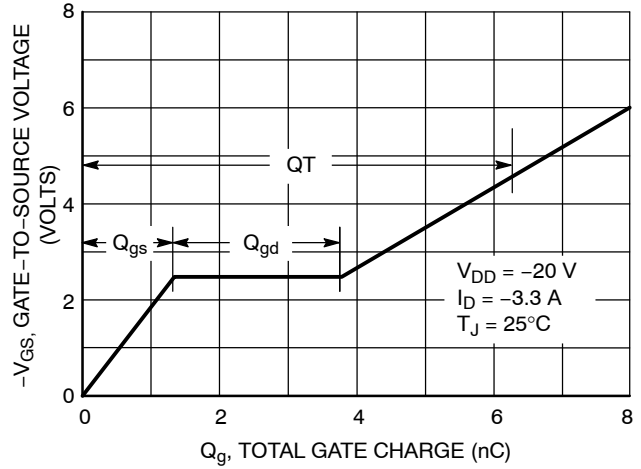
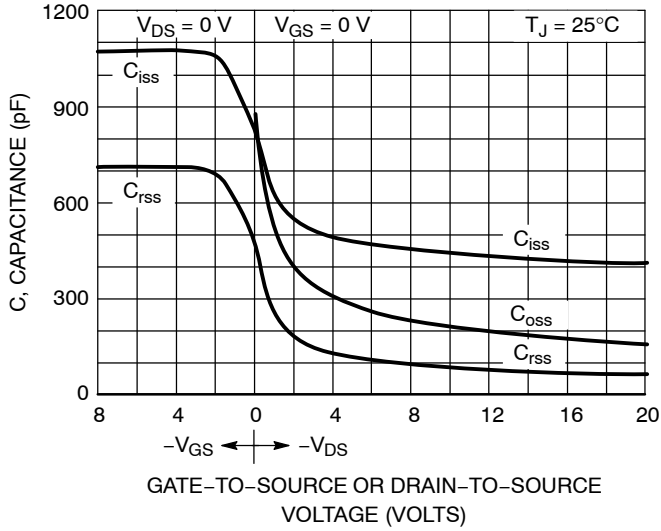


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS



NTGS3441, NVGS3441

TYPICAL ELECTRICAL CHARACTERISTICS

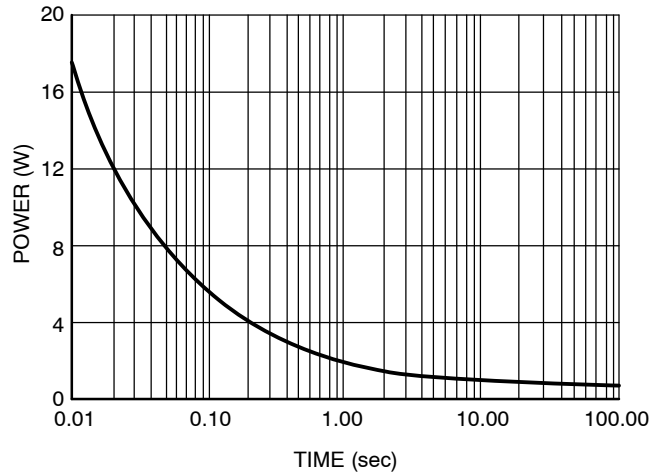


Figure 11. Single Pulse Power

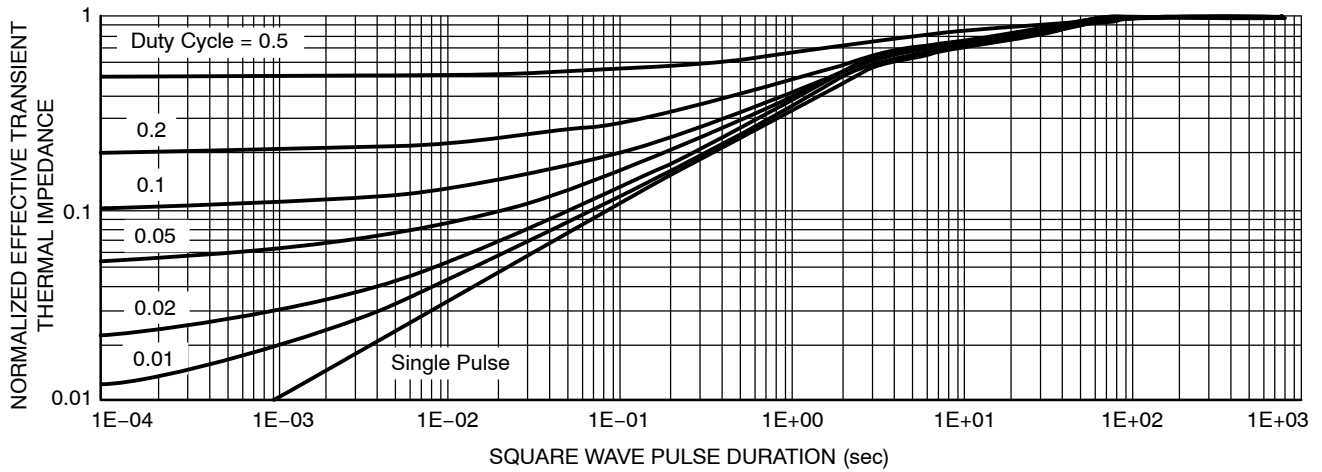
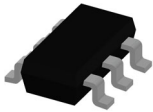


Figure 12. Normalized Thermal Transient Impedance, Junction-to-Ambient

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



TSOP-6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

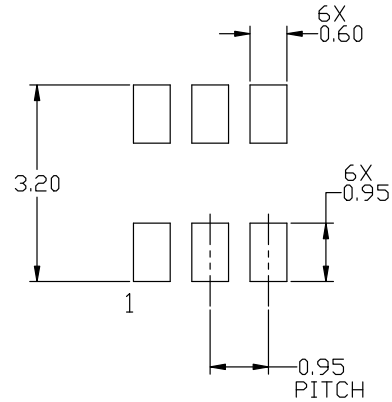
DATE 26 FEB 2024



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN 1 INDICATOR MUST BE LOCATED IN THE INDICATED ZONE

| MILLIMETERS | | | |
|-------------|----------|------|------|
| DIM | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.01 | 0.06 | 0.10 |
| A2 | 0.80 | 0.90 | 1.00 |
| b | 0.25 | 0.38 | 0.50 |
| c | 0.10 | 0.18 | 0.26 |
| D | 2.90 | 3.00 | 3.10 |
| E | 2.50 | 2.75 | 3.00 |
| E1 | 1.30 | 1.50 | 1.70 |
| e | 0.85 | 0.95 | 1.05 |
| L | 0.20 | 0.40 | 0.60 |
| L2 | 0.25 BSC | | |
| M | 0° | --- | 10° |



RECOMMENDED MOUNTING FOOTPRINT

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference manual, SOLDERRM/D.

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



TSOP-6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

DATE 26 FEB 2024

GENERIC MARKING DIAGRAM*



IC



STANDARD

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package

XXX = Specific Device Code
M = Date Code
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

- | | | | | | |
|--|--|---|---|---|--|
| <p>STYLE 1: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN</p> | <p>STYLE 2: PIN 1. EMITTER 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. BASE 2 6. COLLECTOR 2</p> | <p>STYLE 3: PIN 1. ENABLE 2. N/C 3. R BOOST 4. Vz 5. V in 6. V out</p> | <p>STYLE 4: PIN 1. N/C 2. V in 3. NOT USED 4. GROUND 5. ENABLE 6. LOAD</p> | <p>STYLE 5: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2</p> | <p>STYLE 6: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR</p> |
| <p>STYLE 7: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. N/C 5. COLLECTOR 6. EMITTER</p> | <p>STYLE 8: PIN 1. Vbus 2. D(in) 3. D(in)+ 4. D(out)+ 5. D(out) 6. GND</p> | <p>STYLE 9: PIN 1. LOW VOLTAGE GATE 2. DRAIN 3. SOURCE 4. DRAIN 5. DRAIN 6. HIGH VOLTAGE GATE</p> | <p>STYLE 10: PIN 1. D(OUT)+ 2. GND 3. D(OUT)- 4. D(IN)- 5. VBUS 6. D(IN)+</p> | <p>STYLE 11: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1/GATE 2</p> | <p>STYLE 12: PIN 1. I/O 2. GROUND 3. I/O 4. I/O 5. VCC 6. I/O</p> |
| <p>STYLE 13: PIN 1. GATE 1 2. SOURCE 2 3. GATE 2 4. DRAIN 2 5. SOURCE 1 6. DRAIN 1</p> | <p>STYLE 14: PIN 1. ANODE 2. SOURCE 3. GATE 4. CATHODE/DRAIN 5. CATHODE/DRAIN 6. CATHODE/DRAIN</p> | <p>STYLE 15: PIN 1. ANODE 2. SOURCE 3. GATE 4. DRAIN 5. N/C 6. CATHODE</p> | <p>STYLE 16: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE</p> | <p>STYLE 17: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR</p> | |

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