

MOSFET – N-Channel Shielded Gate POWERTRENCH®

150 V, 15 mΩ, 61.3 A

NVDS015N15MC

Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 15 mΩ at V_{GS} = 10 V, I_D = 29 A
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Primary Side for 48 V Isolated Bus
- SR for MV Secondary Applications

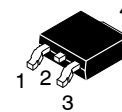
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Symbol	Parameter			Value	Unit
V _{DSS}	Drain-to-Source Voltage			150	V
V _{GS}	Gate-to-Source Voltage			±20	V
I _D	Continuous Drain Current R _{θJC} (Note 2)	Steady State	T _C = 25°C	61.3	A
			T _C = 100°C	43.4	
P _D	Power Dissipation R _{θJC} (Note 2)		T _C = 25°C	107.1	W
			T _C = 100°C	53.6	
I _D	Continuous Drain Current R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	10.5	A
			T _A = 100°C	7.4	
P _D	Power Dissipation R _{θJA} (Notes 1, 2)		T _A = 25°C	3.1	W
			T _A = 100°C	1.6	
I _{DM}	Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		382	A
T _J , T _{stg}	Operating Junction and Storage Temperature Range			–55 to +175	°C
I _S	Source Current (Body Diode)			89.3	A
E _{AS}	Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 4.4 A)			1301	mJ
T _L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	°C

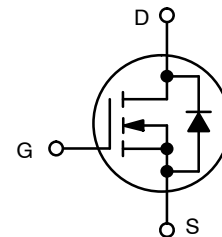
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
150 V	15 mΩ @ 10 V	61.3 A

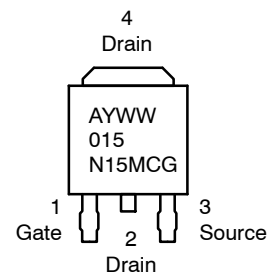


DPAK
CASE 369C



N-CHANNEL MOSFET

MARKING DIAGRAM



015N15MCG = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
NVDS015N15MCT4G	DPAK (Pb-Free)	2,500 / Tape & Reel

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

NVDS015N15MC

THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State (Note 2)	1.4	°C/W
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Notes 1, 2)	47.9	

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150			V
$V_{(BR)DSS}/T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, ref to 25°C		83		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = 120\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	μA
			$T_J = 125^\circ\text{C}$		1.1	
I_{GSS}	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 162\text{ }\mu\text{A}$	2.5		4.5	V
$V_{GS(TH)}/T_J$	Negative Threshold Temperature Coefficient	$I_D = 162\text{ }\mu\text{A}$, ref to 25°C		-8.2		mV/°C
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 29\text{ A}$		11.8	15	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 29\text{ A}$		58		S

CHARGES, CAPACITANCES & GATE RESISTANCE

C_{ISS}	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 75\text{ V}$		2120		pF
C_{OSS}	Output Capacitance			595		
C_{RSS}	Reverse Transfer Capacitance			10.5		
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 75\text{ V}; I_D = 29\text{ A}$		27		nC
$Q_{G(TH)}$	Threshold Gate Charge			7		
Q_{GS}	Gate-to-Source Charge			11		
Q_{GD}	Gate-to-Drain Charge			4		
V_{GP}	Plateau Voltage			5.5		V

SWITCHING CHARACTERISTICS (Note 3)

$t_{d(ON)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DD} = 75\text{ V}, I_D = 29\text{ A}, R_G = 6\text{ }\Omega$		16		ns
t_r	Rise Time			5		
$t_{d(OFF)}$	Turn-Off Delay Time			21		
t_f	Fall Time			4		

DRAIN-SOURCE DIODE CHARACTERISTICS

V_{SD}	Forward Diode Voltage	$V_{GS} = 0\text{ V}, I_S = 29\text{ A}$	$T_J = 25^\circ\text{C}$		0.89	1.2	V
t_{RR}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, V_{DD} = 75\text{ V}$ $dI_S/dt = 300\text{ A}/\mu\text{s}, I_S = 29\text{ A}$		49			ns
Q_{RR}	Reverse Recovery Charge			197			nC
t_{RR}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, V_{DD} = 75\text{ V}$ $dI_S/dt = 1000\text{ A}/\mu\text{s}, I_S = 29\text{ A}$		34			ns
Q_{RR}	Reverse Recovery Charge			345			nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

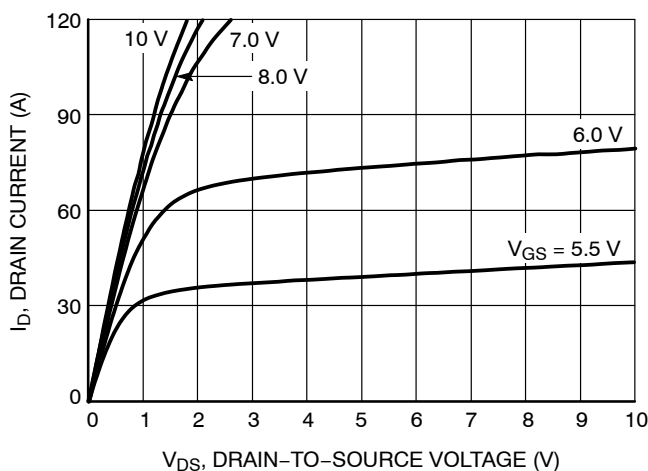


Figure 1. On-Region Characteristics

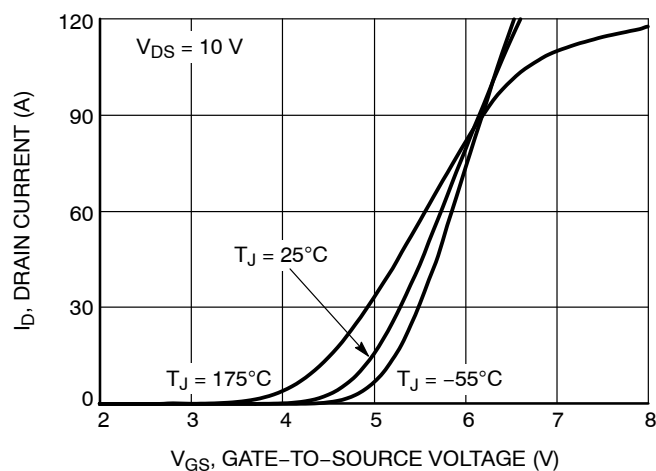


Figure 2. Transfer Characteristics

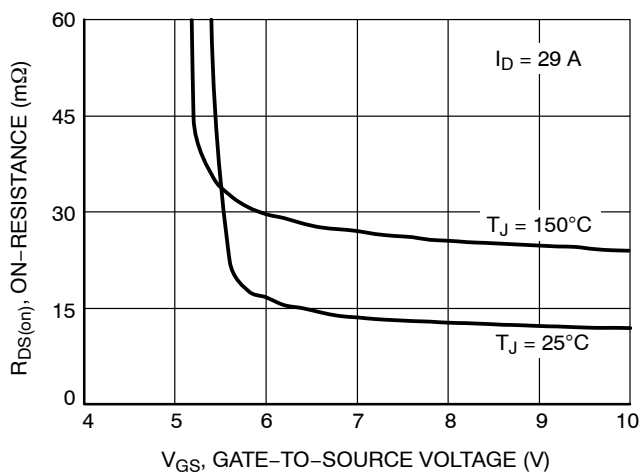


Figure 3. On-Resistance vs. Gate-to-Source Voltage

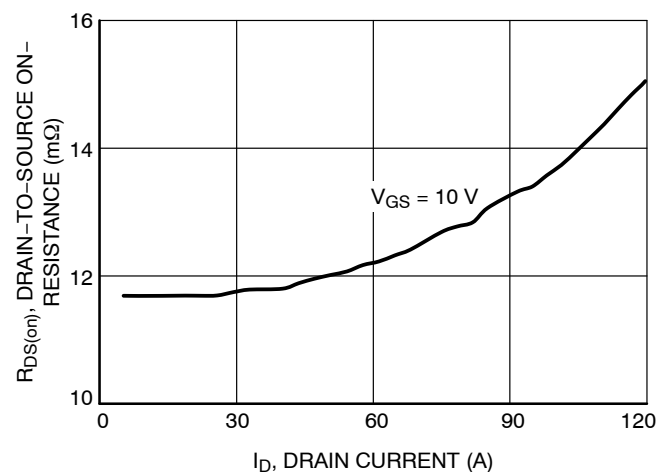


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

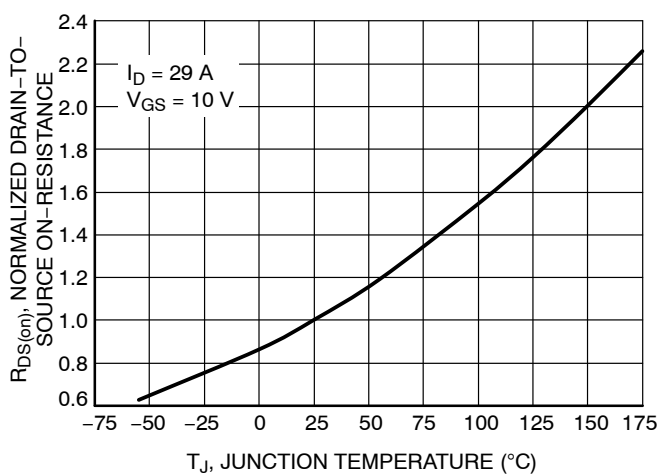


Figure 5. Normalized On-Resistance vs. Junction Temperature

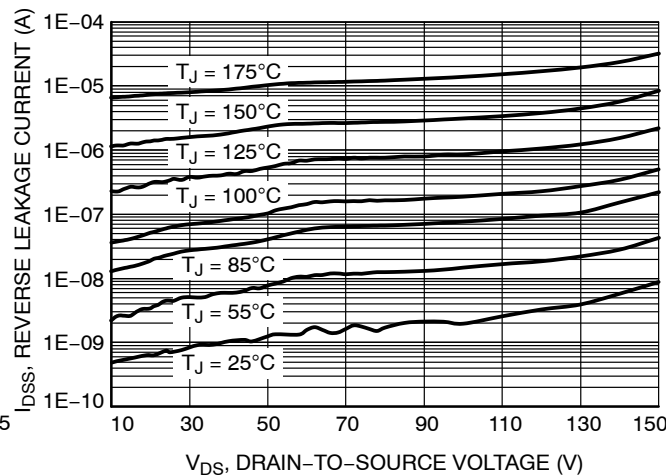


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS (continue)

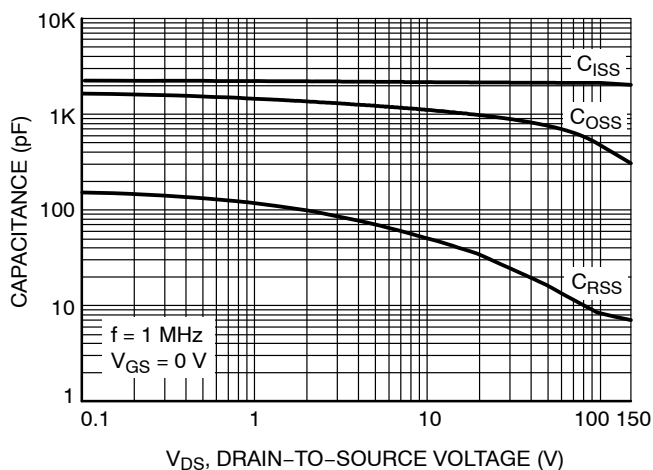


Figure 7. Capacitance vs. Drain-to-Source Voltage

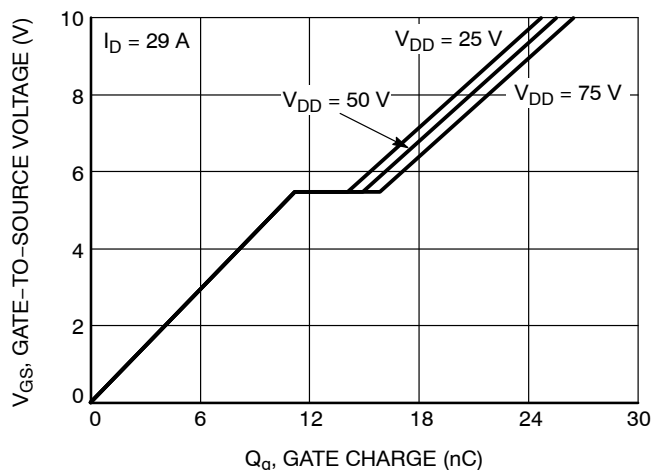


Figure 8. Gate Charge Characteristics

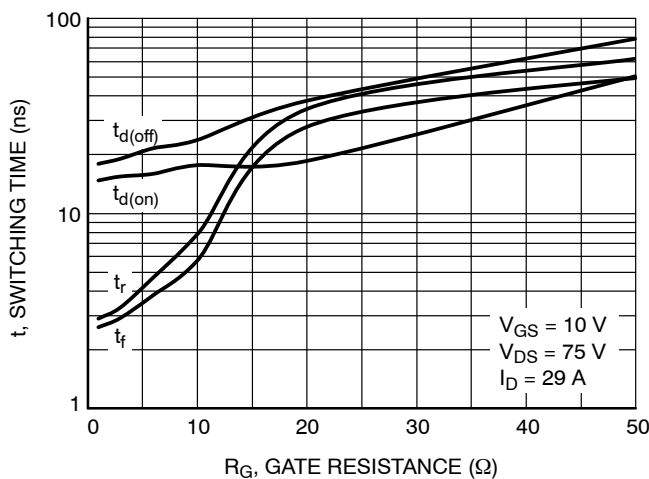


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

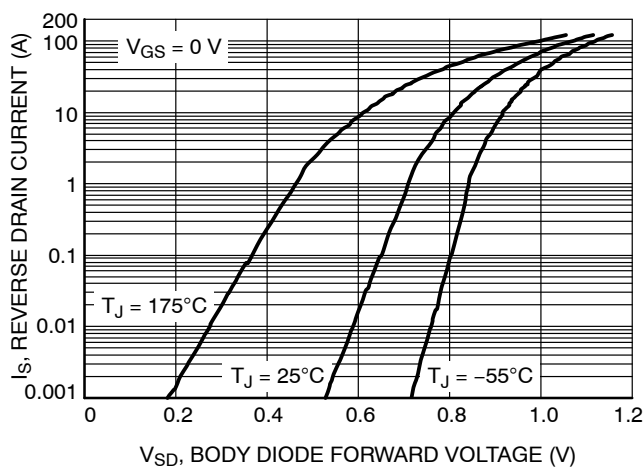


Figure 10. Source-to-Drain Diode Forward Voltage vs. Source Current

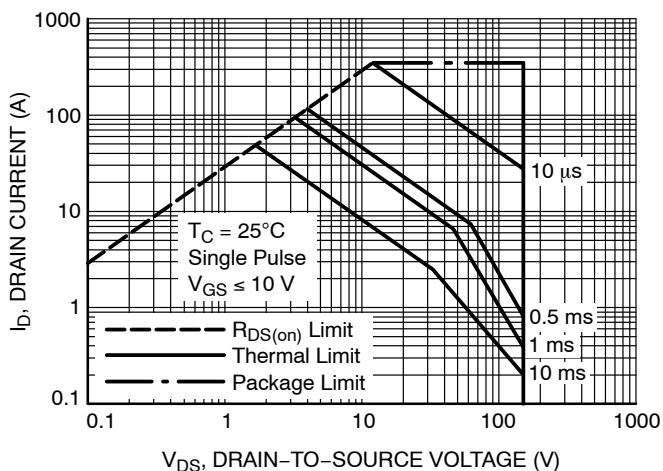


Figure 11. Forward Bias Safe Operating Area

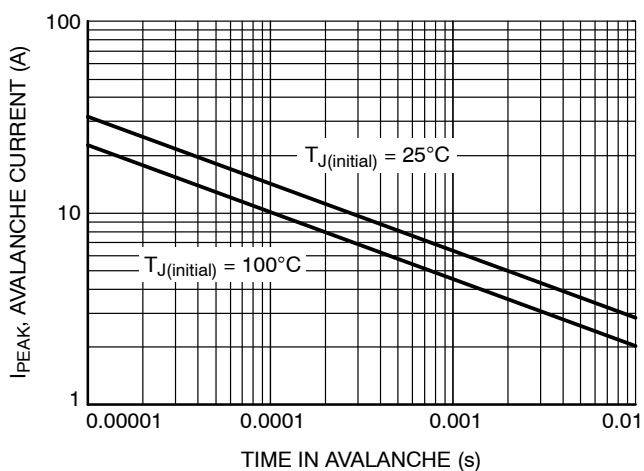


Figure 12. Unclamped Inductive Switching Capability

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TYPICAL CHARACTERISTICS (continue)

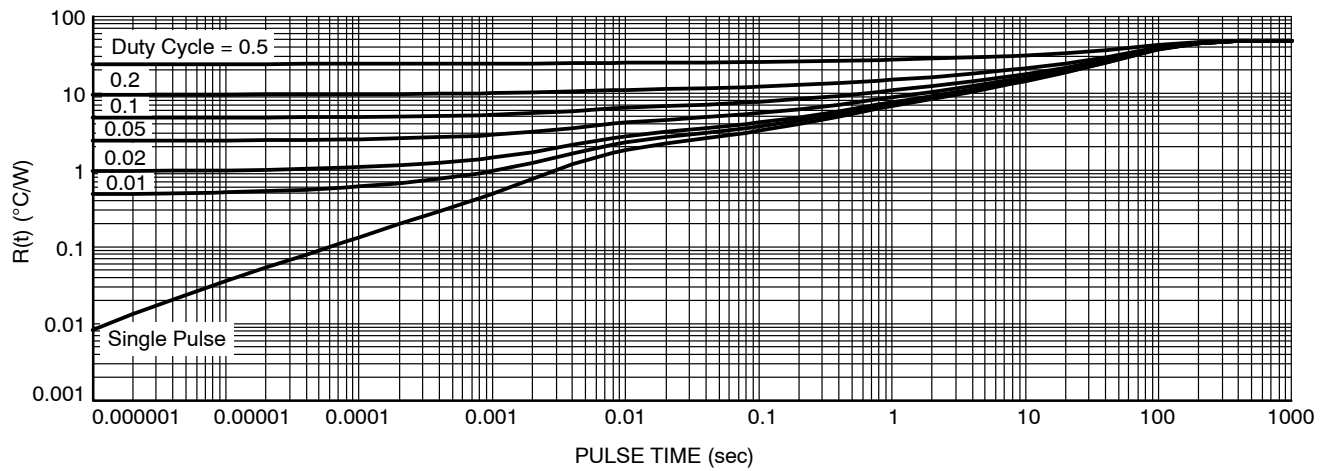


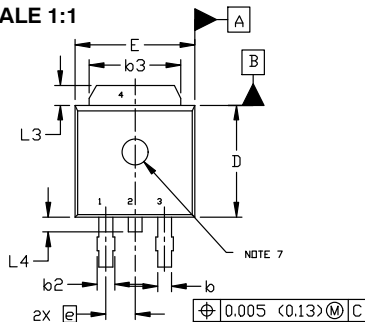
Figure 13. Transient Thermal Impedance



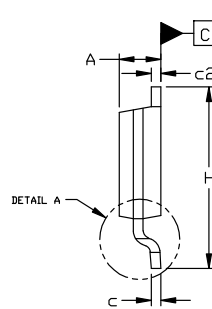
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CASE 369C
ISSUE G

DATE 31 MAY 2023

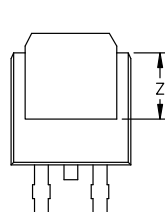
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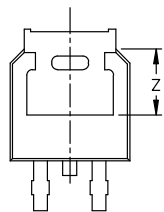
TOP VIEW



SIDE VIEW

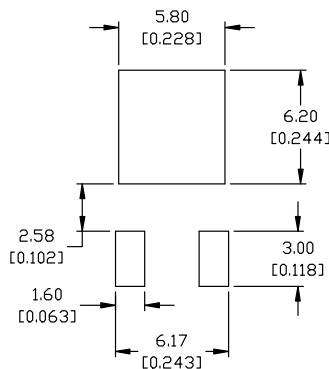


BOTTOM VIEW



BOTTOM VIEW

ALTERNATE
CONSTRUCTIONS



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.

STYLE 1:

PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:

PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 3:

PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:

PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 5:

PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:

PIN 1. MT1
2. MT2
3. GATE
4. MT2

STYLE 7:

PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:

PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:

PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:

PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

NOTES:

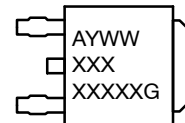
1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29	BSC
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	REF	2.90	REF
L2	0.020	BSC	0.51	BSC
L3	0.035	0.050	0.89	1.27
L4	----	0.040	---	1.01
Z	0.155	----	3.93	---

GENERIC
MARKING DIAGRAM*



IC



Discrete

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = 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.

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