NTD5C464N

Power MOSFET
40 V, 5.8 mΩ, 59 A, Single N−Channel

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

ON Semiconductor®

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$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
40 V	5.8 mΩ @ 10 V	59 A

N−CHANNEL MOSFET

DPAK
CASE 369C
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT

A = Assembly Location
Y = Year
WW = Work Week
5C464N = Device Code
G = Pb−Free Package

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	40	V
Gate−to−Source Voltage			V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1 & 3)	Steady State	T_C = 25°C	I_D	59	A
		T_C = 100°C		44	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	40	W
		T_C = 100°C		20	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3)	Steady State	T_A = 25°C	I_D	19	A
		T_A = 100°C		14	
Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)		T_A = 25°C	P_D	4.0	W
		T_A = 100°C		2.0	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	320	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 175	°C
Source Current (Body Diode)			I_S	44	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 5 A)			E_{AS}	136	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	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.

THERMAL RESISTANCE MAXIMUM RATINGS

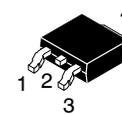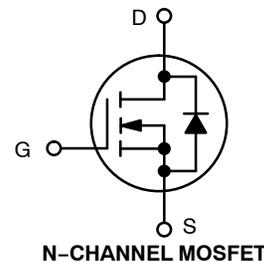| Parameter	Symbol	Value	Unit
Junction−to−Case (Drain) (Note 1)	$R_{\theta JC}$	3.8	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	38	

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface−mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.
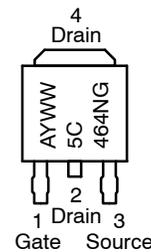
ORDERING INFORMATION
See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		40			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 40 V	T_J = 25°C			10	μA
			T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				6.8		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A			4.8	5.8	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 3 V, I_D = 30 A			55		S
CHARGES, CAPACITANCES AND GATE RESISTANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 20 V			1200		pF
Output Capacitance	C_{oss}				580		
Reverse Transfer Capacitance	C_{rss}				32		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 20 V, I_D = 30 A			20		nC
Threshold Gate Charge	$Q_{G(TH)}$				3.7		
Gate−to−Source Charge	Q_{GS}				6.2		
Gate−to−Drain Charge	Q_{GD}				4.0		
Plateau Voltage	V_{GP}				5.0		V
SWITCHING CHARACTERISTICS (Note 5)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 20 V, I_D = 30 A, R_G = 2.5 Ω			9		ns
Rise Time	t_r				40		
Turn−Off Delay Time	$t_{d(off)}$				18		
Fall Time	t_f				5		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 30 A	T_J = 25°C		0.9	1.2	V
			T_J = 125°C		0.8		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 30 A			32		ns
Charge Time	ta				16		
Discharge Time	tb				17		
Reverse Recovery Charge	Q_{RR}				20		nC

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.
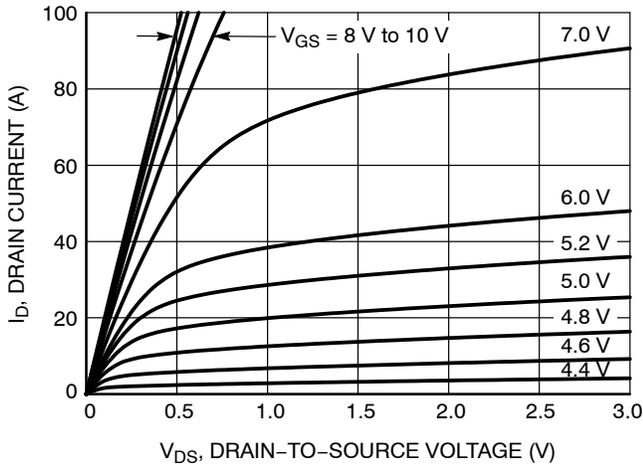
NTD5C464N

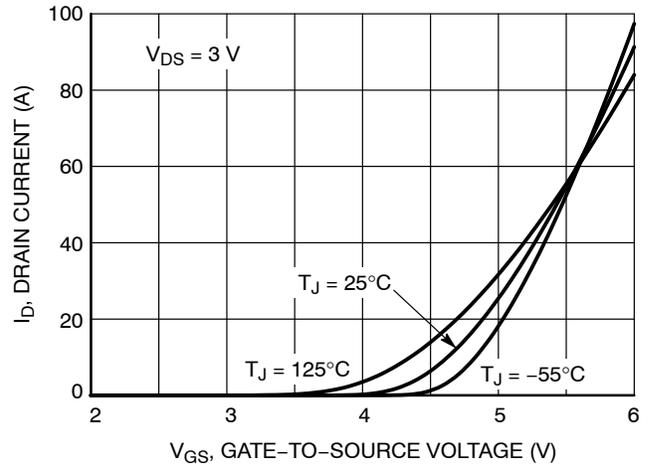Figure 1. On−Region Characteristics

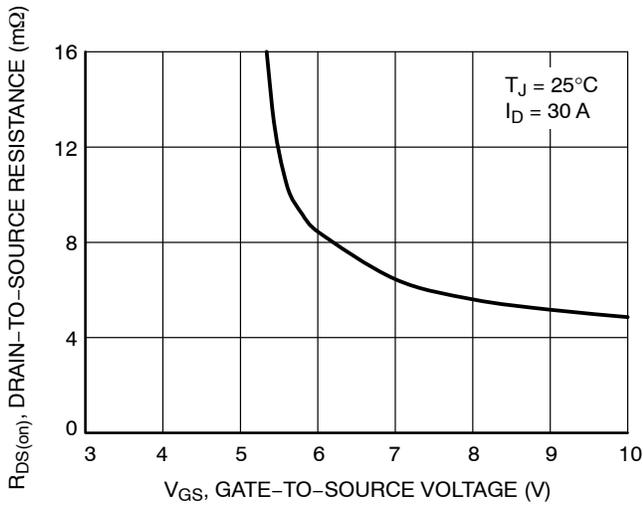Figure 2. Transfer Characteristics

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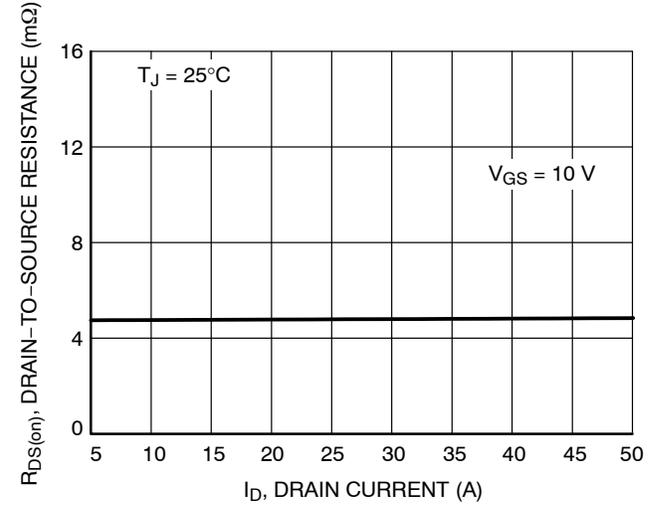Voltage

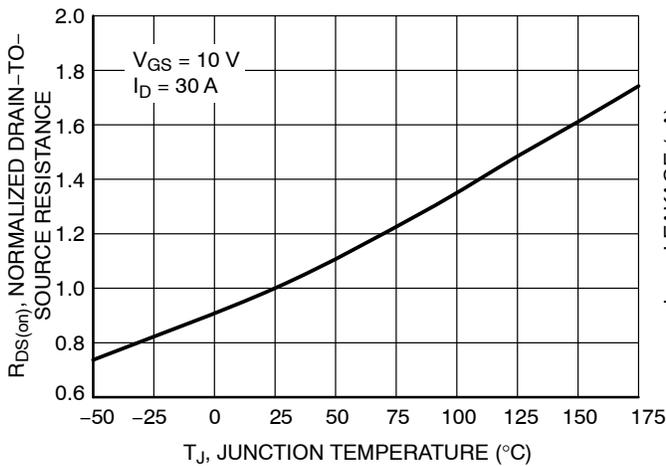Figure 4. On−Resistance vs. Drain Current and
Gate Voltage

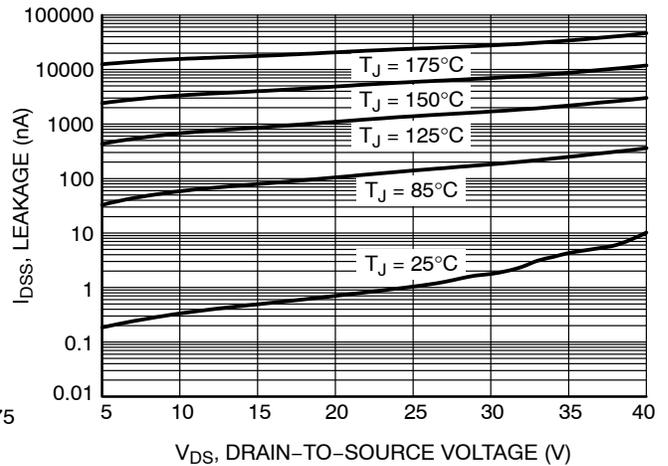Figure 5. On−Resistance Variation with
Temperature

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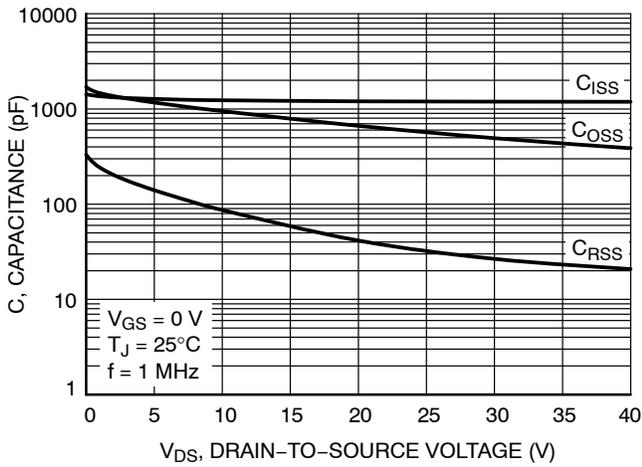vs. Voltage

NTD5C464N
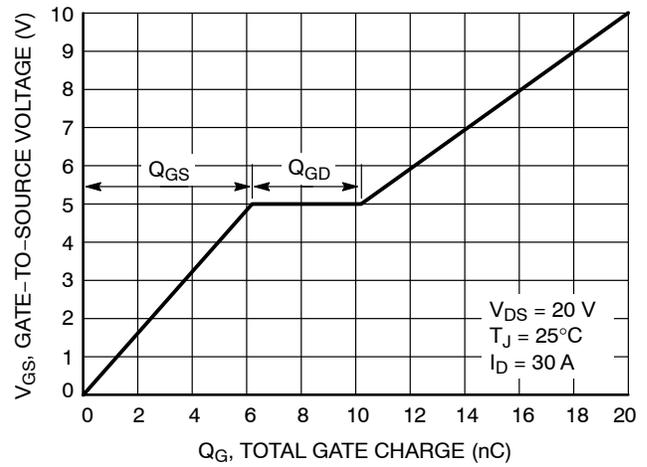
TYPICAL CHARACTERISTICS

Figure 7. Capacitance Variation
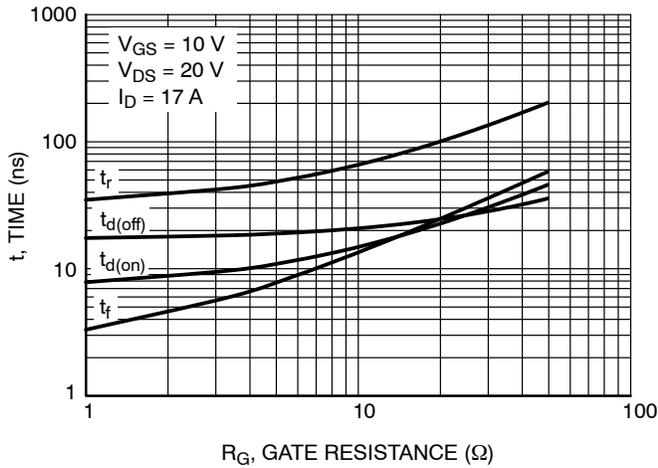

Figure 8. Gate−to−Source vs. Total Charge

Figure 9. Resistive Switching Time Variation vs. Gate Resistance
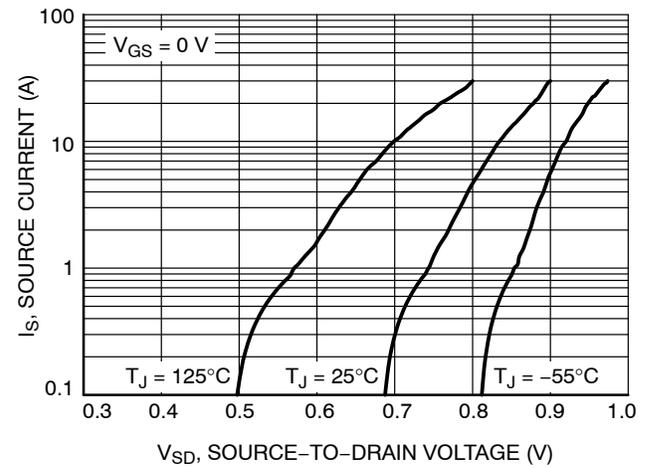
Figure 10. Diode Forward Voltage vs. Current
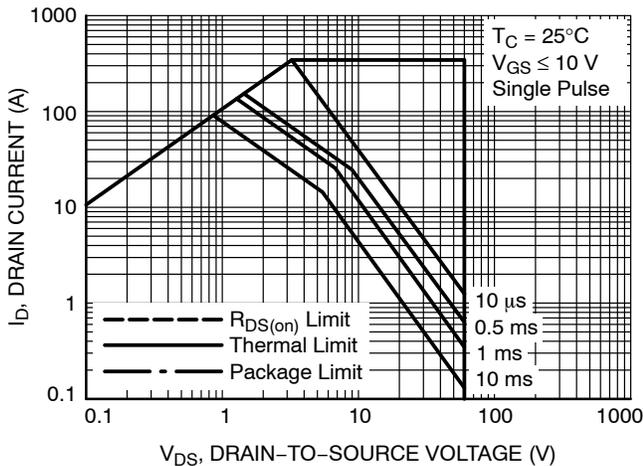
Figure 11. Maximum Rated Forward Biased Safe Operating Area
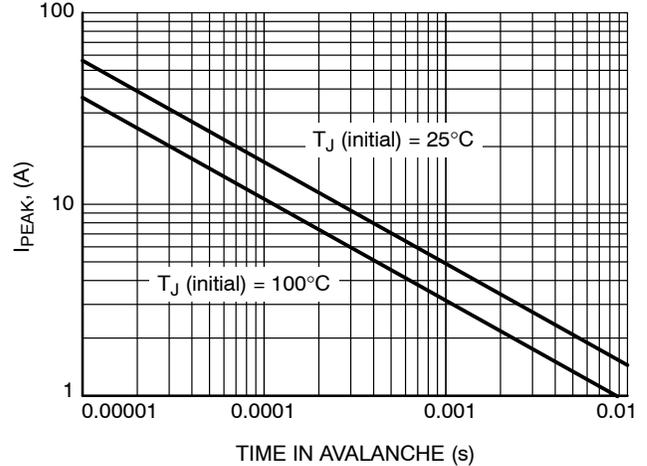
Figure 12. I$_{PEAK}$ vs. Time in Avalanche

TYPICAL CHARACTERISTICS
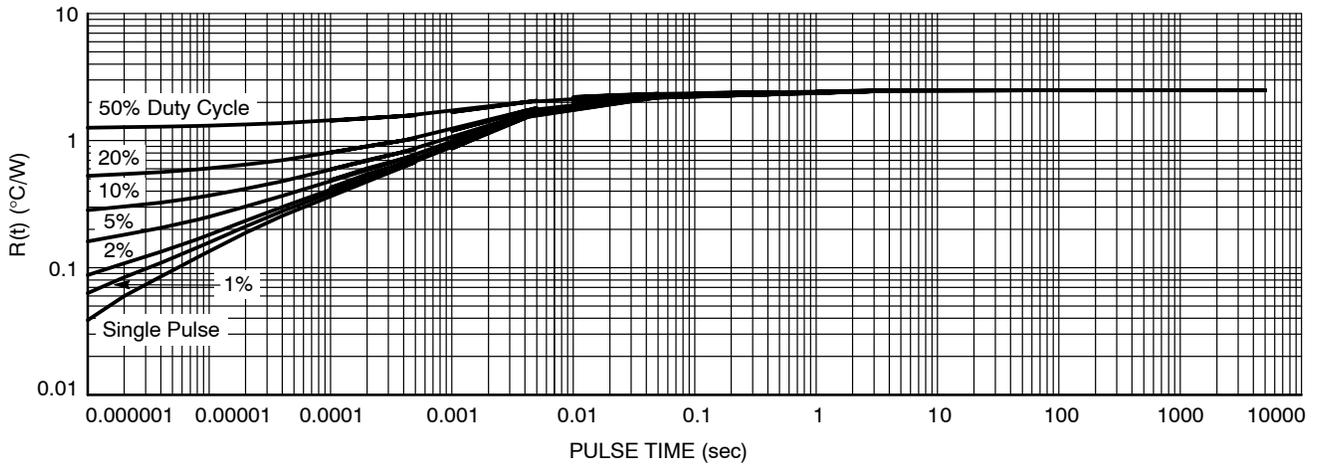
Figure 13. Thermal Characteristics

ORDERING INFORMATION

Order Number	Package	Shipping[†]
NTD5C464NT4G	DPAK (Pb−Free)	2500 / 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.

NTD5C464N

PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE F

TOP VIEW

SIDE VIEW

DETAIL A

BOTTOM VIEW

DETAIL A
ROTATED 90° CW

BOTTOM VIEW
ALTERNATE
CONSTRUCTIONS

⊕ | 0.005 (0.13) Ⓜ | C
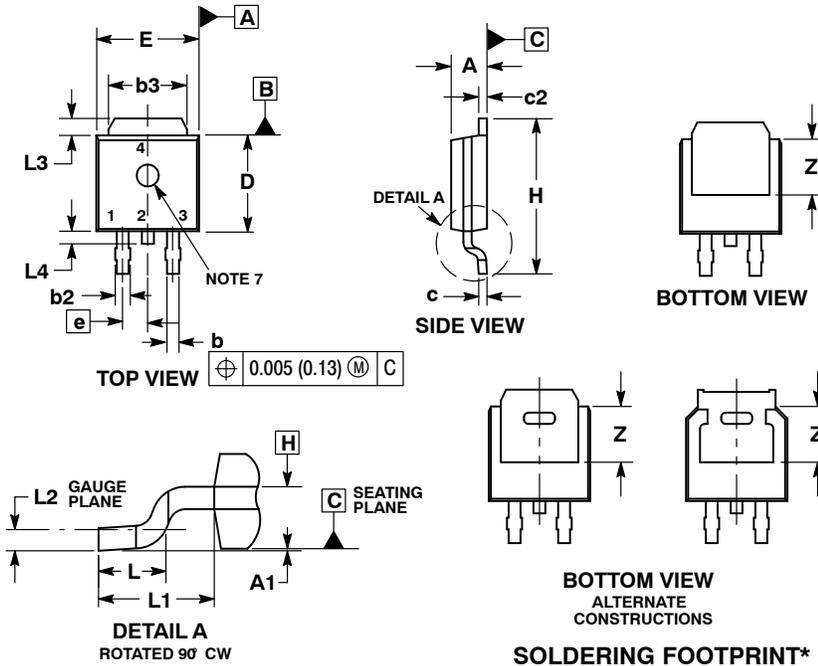
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES 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	---

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

SOLDERING FOOTPRINT*
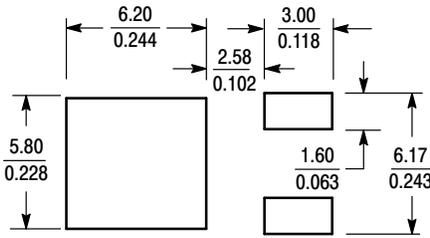
SCALE 3:1 $\left(\dfrac{\text{mm}}{\text{inches}}\right)$

*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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