

NVBLS0D5N04M8

MOSFET – Power, Single, N-Channel

40 V, 300 A, 0.57 mΩ

Features

- Typical $R_{DS(on)}$ = 0.46 mΩ at $V_{GS} = 10$ V, $I_D = 80$ A
- Typical $Q_{g(tot)}$ = 220 nC at $V_{GS} = 10$ V, $I_D = 80$ A
- UIS Capability
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

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

Parameter	Symbol	Ratings	Units
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Drain Current – Continuous ($V_{GS} = 10$) (Note 1)	I_D	300	A
Pulsed Drain Current $T_C = 25^\circ\text{C}$		See Figure 4	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	1064	mJ
Power Dissipation	P_D	429	W
Derate Above 25°C		2.86	W/ $^\circ\text{C}$
Operating and Storage Temperature	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.35	$^\circ\text{C}/\text{W}$
Maximum Thermal Resistance, Junction-to-Ambient (Note 3)	$R_{\theta JA}$	43	$^\circ\text{C}/\text{W}$

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. Current is limited by bondwire configuration.
2. Starting $T_J = 25^\circ\text{C}$, $L = 0.3$ mH, $I_{AS} = 84$ A, $V_{DD} = 40$ V during inductor charging and $V_{DD} = 0$ V during time in avalanche.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2 oz copper.

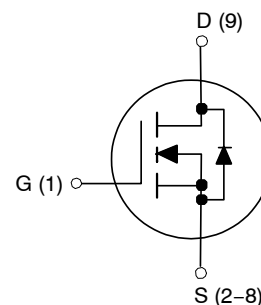


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**MO-299A
CASE 100CU**



ORDERING INFORMATION

Device	Package	Marking
NVBLS0D5N04M8TXG	MO-299A (Pb-Free)	0D5N04M8

NVBLS0D5N04M8

Table 1. ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
OFF CHARACTERISTICS							
B_{VDSS}	Drain-to-Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	40	-	-	V	
I_{DSS}	Drain-to-Source Leakage Current	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$	-	-	1	μA
			$T_J = 175^\circ\text{C}$ (Note 4)	-	-	1	mA
I_{GSS}	Gate-to-Source Leakage Current	$V_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA	
ON CHARACTERISTICS							
$V_{GS(th)}$	Gate-to-Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.0	3.0	4.0	V	
$R_{DS(on)}$	Drain-to-Source On Resistance	$I_D = 80 \text{ A}, V_{GS} = 10 \text{ V}$	-	0.46	0.57	$\text{m}\Omega$	
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	15900	-	pF	
C_{oss}	Output Capacitance		-	4000	-	pF	
C_{rss}	Reverse Transfer Capacitance		-	600	-	pF	
R_g	Gate Resistance	$f = 1 \text{ MHz}$	-	2.6	-	Ω	
$Q_{g(ToT)}$	Total Gate Charge at 10 V	$V_{GS} = 0 \text{ to } 10 \text{ V}$	-	220	296	nC	
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 0 \text{ to } 2 \text{ V}$					
Q_{gs}	Gate-to-Source Gate Charge		-	73	-	nC	
Q_{gd}	Gate-to-Drain "Miller" Charge		-	41	-	nC	
SWITCHING CHARACTERISTICS							
t_{on}	Turn-On Time	$V_{DD} = 20 \text{ V}, I_D = 80 \text{ A}, V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$	-	-	221	ns	
$t_{d(on)}$	Turn-On Delay		-	54	-	ns	
t_r	Rise Time		-	82	-	ns	
$t_{d(off)}$	Turn-Off Delay		-	106	-	ns	
t_f	Fall Time		-	52	-	ns	
t_{off}	Turn-Off Time		-	-	215	ns	
DRAIN-SOURCE DIODE CHARACTERISTICS							
V_{SD}	Source-to-Drain Diode Voltage	$I_{SD} = 80 \text{ A}, V_{GS} = 0 \text{ V}$	-	-	1.25	V	
		$I_{SD} = 40 \text{ A}, V_{GS} = 0 \text{ V}$	-	-	1.2	V	
t_{rr}	Reverse-Recovery Time	$I_F = 80 \text{ A}, dI_{SD}/dt = 100 \text{ A}/\mu\text{s}, V_{DD} = 32 \text{ V}$	-	119	133	ns	
Q_{rr}	Reverse-Recovery Charge		-	228	274	nC	

4. The maximum value is specified by design at $T_J = 175^\circ\text{C}$. Product is not tested to this condition in production. 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.

Typical Characteristics

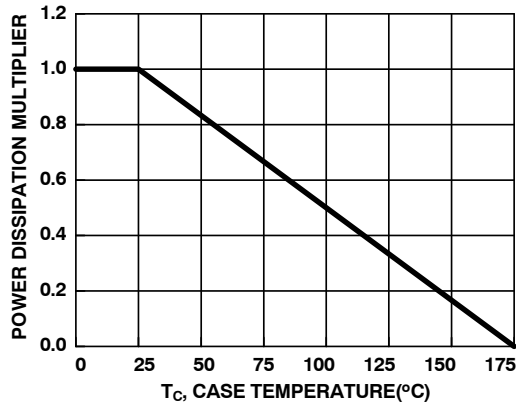


Figure 1. Normalized Power Dissipation vs. Case Temperature

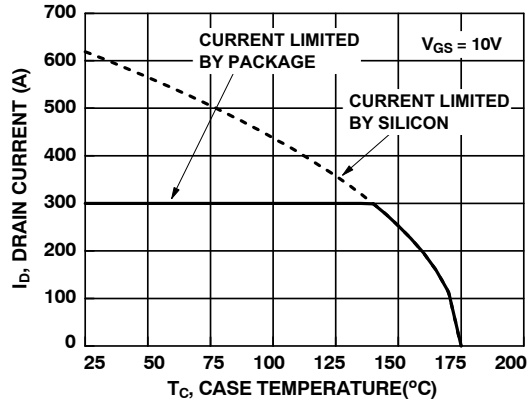


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

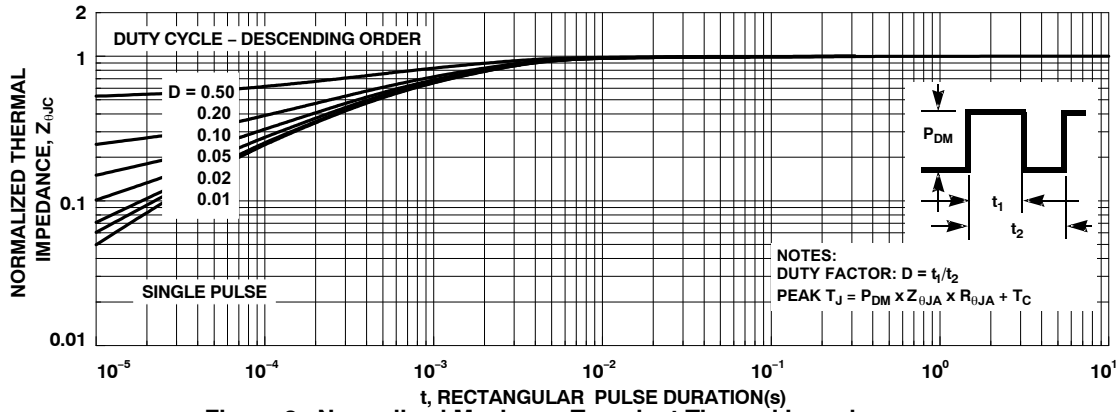


Figure 3. Normalized Maximum Transient Thermal Impedance

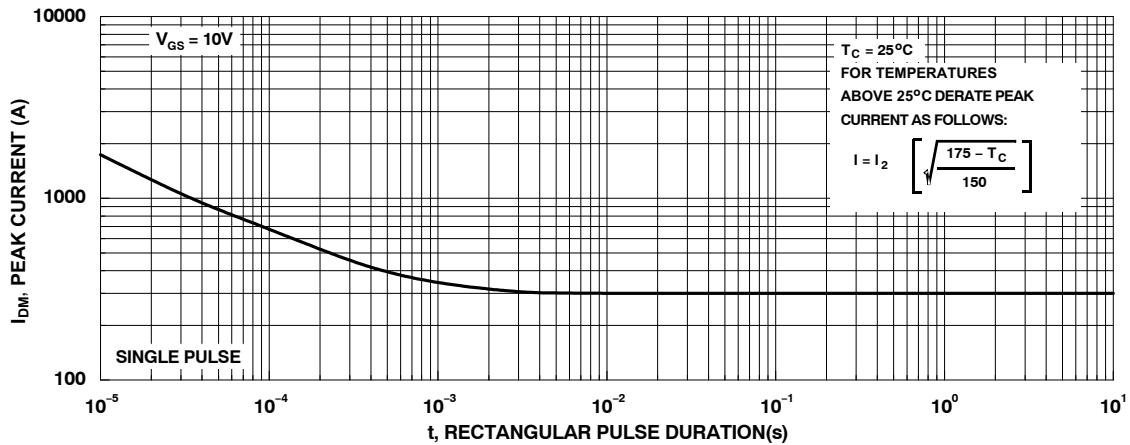


Figure 4. Peak Current Capability

Typical Characteristics

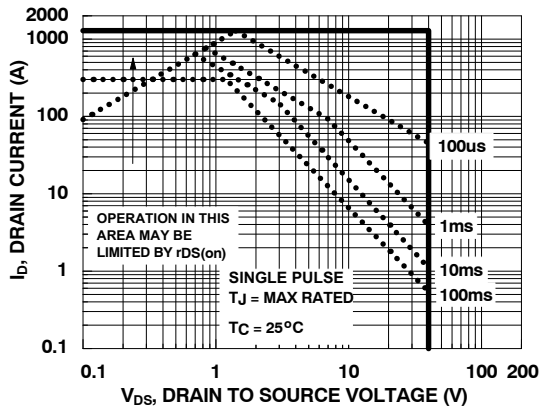
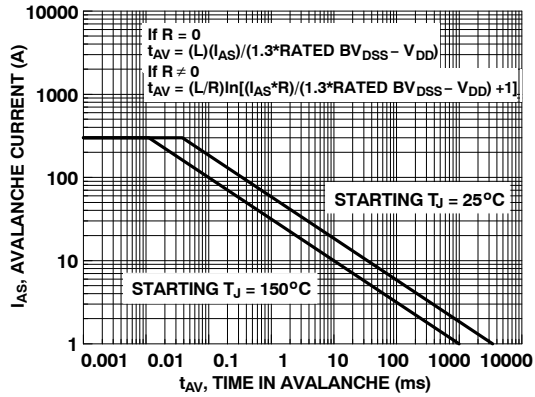


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

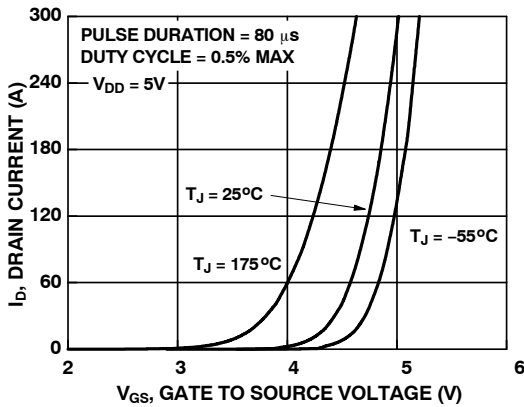


Figure 7. Transfer Characteristics

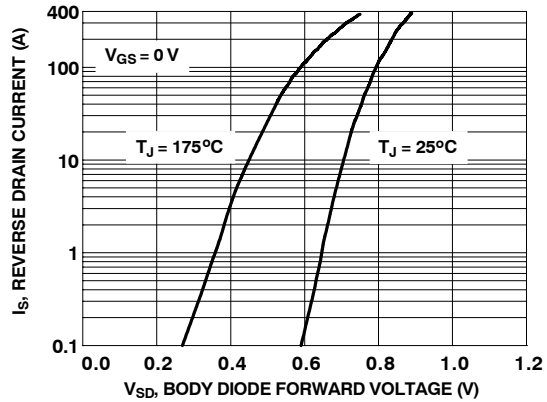


Figure 8. Forward Diode Characteristics

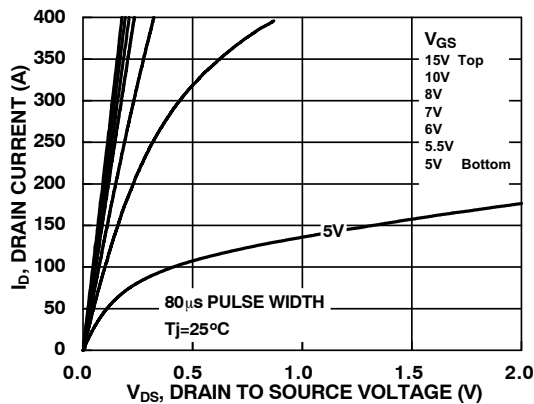


Figure 9. Saturation Characteristics

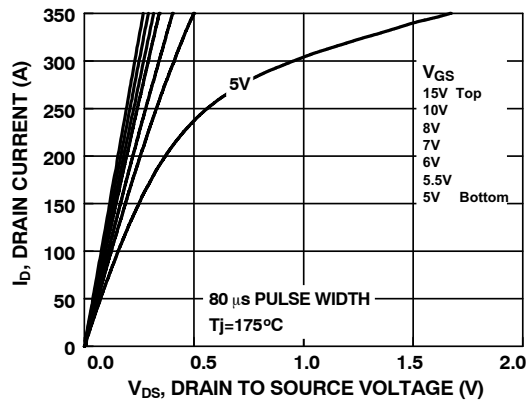


Figure 10. Saturation Characteristics

Typical Characteristics

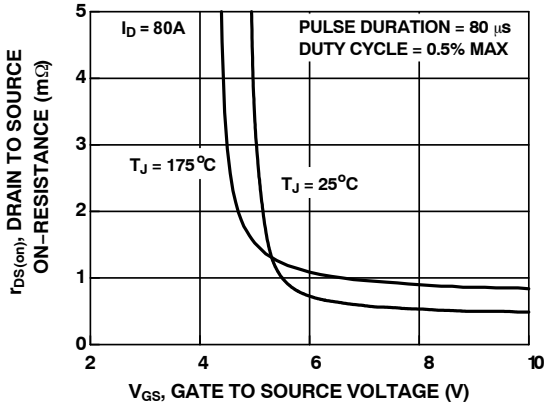


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

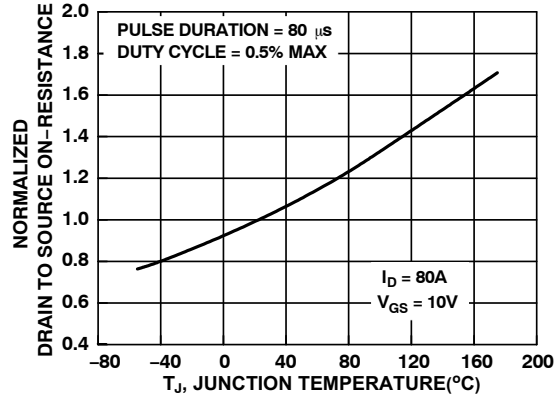


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

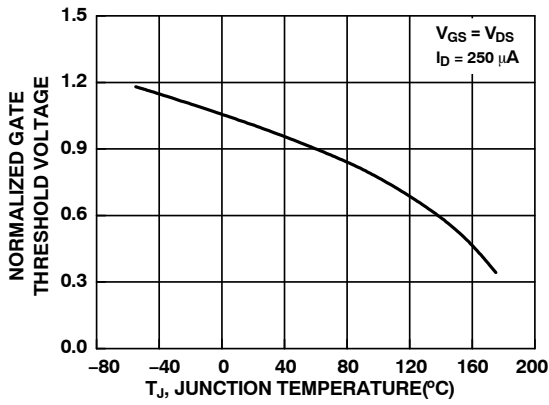


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

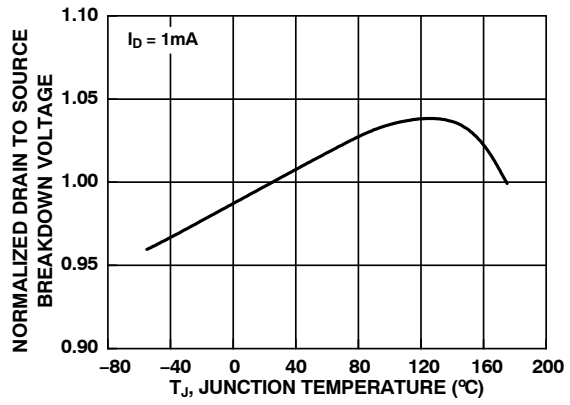


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

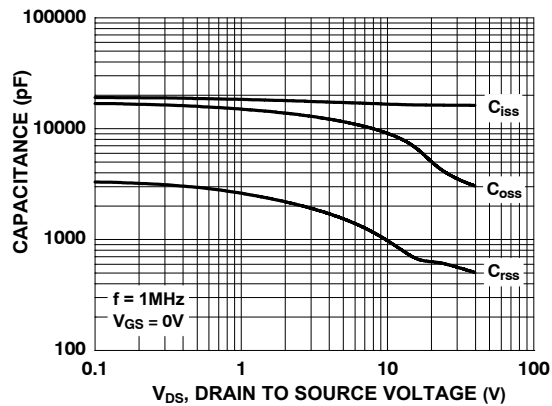


Figure 15. Capacitance vs. Drain to Source Voltage

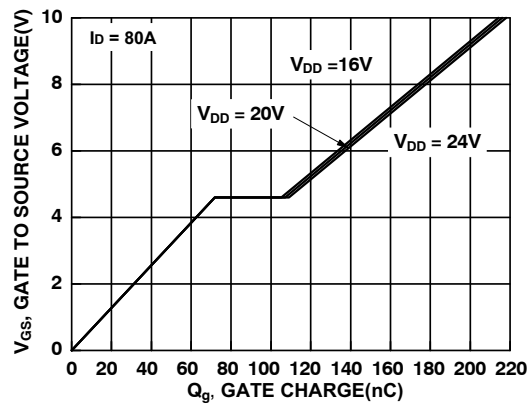
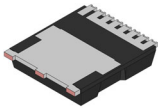


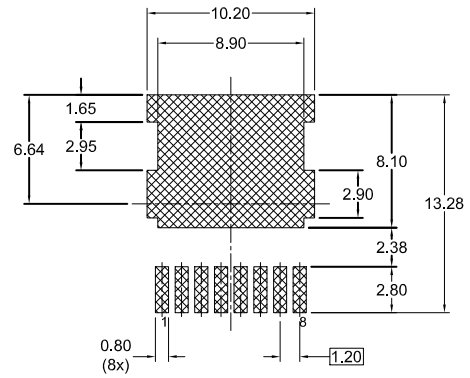
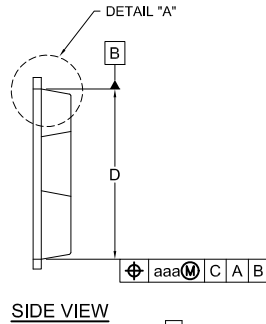
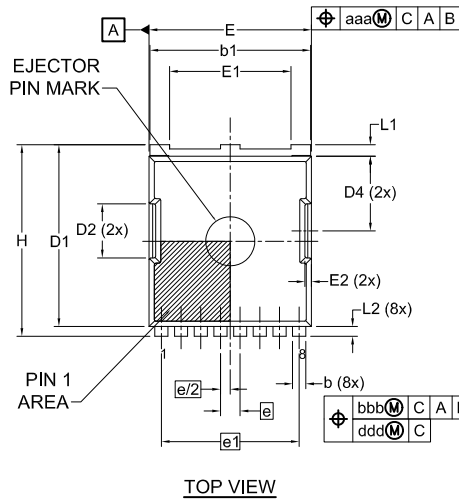
Figure 16. Gate Charge vs. Gate to Source Voltage

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



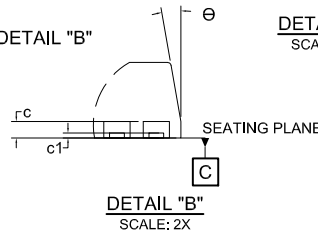
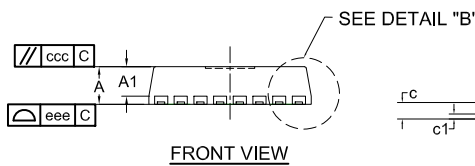
H-PSOF8L 11.68x9.80
CASE 100CU
ISSUE C

DATE 22 MAY 2023



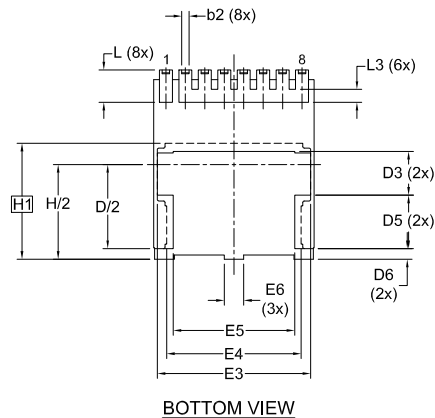
LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

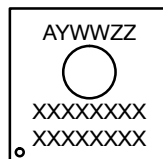


NOTES:

1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
3. CONTROLLING DIMENSION: MILLIMETERS.
4. COPLANARITY APPLIES TO THE EXPOSED WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.



GENERIC MARKING DIAGRAM*



A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code
XXXX = Specific Device Code

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.35	0.45	0.55
c	0.40	0.50	0.60
c1	0.10	—	—
D	10.28	10.38	10.48
D/2	5.09	5.19	5.29
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	2.60	2.70	2.80
D4	4.45	4.55	4.65
D5	3.20	3.30	3.40
D6	0.55	0.65	0.75
E	9.80	9.90	10.00
E1	7.30	7.40	7.50
E2	0.30	0.40	0.50
E3	9.36	9.46	9.56

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E4	8.20	8.30	8.40
E5	7.40	7.50	7.60
E6	1.10	1.20	1.30
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 BSC		
H	11.58	11.68	11.78
H/2	5.74	5.84	5.94
H1	7.15 BSC		
L	1.90	2.00	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.70	0.80	0.90
theta	0°	—	12°
aaa	0.20		
bbb	0.25		
ccc	0.20		
ddd	0.20		
eee	0.10		

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

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