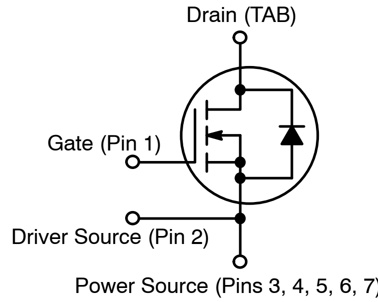
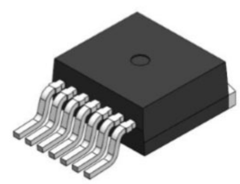
Silicon Carbide (SiC) MOSFET – EliteSiC, 80 mohm, 1200 V, M1, D2PAK-7L

NTBG080N120SC1

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
1200 V	110 mΩ @ 20 V	30 A



N−CHANNEL MOSFET



D2PAK−7L
CASE 418BJ

Features

- Typ. $R_{DS(on)}$ = 80 mΩ
- Ultra Low Gate Charge (Typ. $Q_{G(tot)}$ = 56 nC)
- Low Effective Output Capacitance (Typ. C_{oss} = 79 pF)
- 100% Avalanche Tested
- T_J = 175°C
- This Device is Halide Free and RoHS Compliant with exemption 7a, Pb−Free 2LI (on second level interconnection)

Typical Applications

- UPS
- DC-DC Converter
- Boost Inverter

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	1200	V
Gate−to−Source Voltage			V_{GS}	−15/+25	V
Recommended Operation Values of Gate−Source Voltage		T_C < 175°C	V_{GSop}	−5/+20	V
Continuous Drain Current (Note 1)	Steady State	T_C = 25°C	I_D	30	A
Power Dissipation (Note 1)			P_D	179	W
Continuous Drain Current (Note 1)	Steady State	T_C = 100°C	I_D	21	A
Power Dissipation (Note 1)			P_D	89	W
Pulsed Drain Current (Note 2)		T_C = 25°C	I_{DM}	110	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	18	A
Single Pulse Drain−to−Source Avalanche Energy (I_L = 18.5 A_{pk}, L = 1 mH) (Note 3)			E_{AS}	171	mJ
Maximum Lead Temperature for Soldering, 1/8″ from Case for 10 Seconds			T_L	300	°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. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Repetitive rating, limited by max junction temperature.
3. E_{AS} of 171 mJ is based on starting T_J = 25°C; L = 1 mH, I_{AS} = 18.5 A, V_{DD} = 120 V, V_{GS} = 18 V.

MARKING DIAGRAM

AYWWZZ
NTBG
080120SC1

A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability
NTBG080120SC1 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
NTBG080N120SC1	D2PAK−7L	800 / 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.

Table 1. THERMAL CHARACTERISTICS

Parameter	Symbol	Max	Unit
Thermal Resistance Junction−to−Case (Note 1)	$R_{\theta JC}$	0.84	°C/W
Thermal Resistance Junction−to−Ambient (Note 1)	$R_{\theta JA}$	40	°C/W

Table 2. ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise stated)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA		1200			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 1 mA, refer to 25°C			0.5		V/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V	T_J = 25°C			100	μA
			T_J = 175°C			1	mA
Gate−to−Source Leakage Current	I_{GSS}	V_{GS} = +25/−15 V, V_{DS} = 0 V				±1	μA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 5 mA		1.8	3	4.3	V
Recommended Gate Voltage	V_{GOP}			−5		+20	V
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 20 V, I_D = 20 A, T_J = 25°C			80	110	mΩ
		V_{GS} = 20 V, I_D = 20 A, T_J = 150°C			121		mΩ
Forward Transconductance	g_{FS}	V_{DS} = 20 V, I_D = 20 A			11		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 800 V			1154		pF
Output Capacitance	C_{OSS}				79		
Reverse Transfer Capacitance	C_{RSS}				7.9		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −5/20 V, V_{DS} = 600 V, I_D = 20 A			56		nC
Threshold Gate Charge	$Q_{G(TH)}$				10		
Gate−to−Source Charge	Q_{GS}				18		
Gate−to−Drain Charge	Q_{GD}				11		
Gate−Resistance	R_G	f = 1 MHz			1.2		Ω
SWITCHING CHARACTERISTICS							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = −5/20 V, V_{DS} = 800 V, I_D = 20 A, R_G = 4.7 Ω, Inductive Load			12	22	ns
Rise Time	t_r				12	22	
Turn−Off Delay Time	$t_{d(OFF)}$				21	34	
Fall Time	t_f				9	18	
Turn−On Switching Loss	E_{ON}				135		μJ
Turn−Off Switching Loss	E_{OFF}				46		
Total Switching Loss	E_{TOT}				181		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Continuous Drain−Source Diode Forward Current	I_{SD}	V_{GS} = −5 V, T_J = 25°C				18	A
Pulsed Drain−Source Diode Forward Current (Note 2)	I_{SDM}	V_{GS} = −5 V, T_J = 25°C				110	A
Forward Diode Voltage	V_{SD}	V_{GS} = −5 V, I_{SD} = 10 A, T_J = 25°C			3.9		V

Table 2. ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise stated) (continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
DRAIN−SOURCE DIODE CHARACTERISTICS						
Reverse Recovery Time	t_{RR}	V_{GS} = −5/20 V, I_{SD} = 20 A, dI_S/dt = 1000 A/μs		16.2		ns
Reverse Recovery Charge	Q_{RR}			61.6		nC
Reverse Recovery Energy	E_{REC}			4.1		μJ
Peak Reverse Recovery Current	I_{RRM}			7.6		A

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

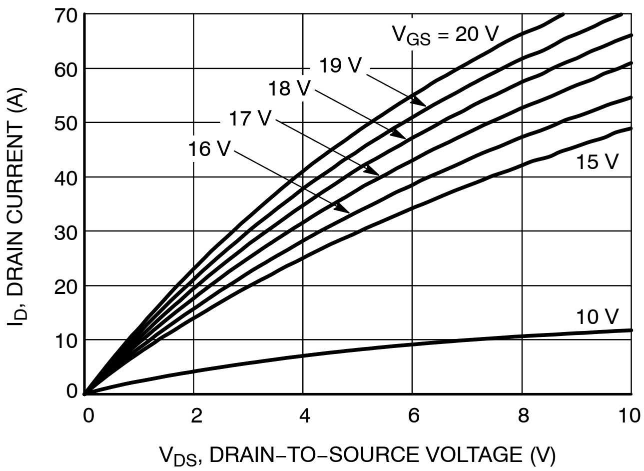


Figure 1. On−Region Characteristics

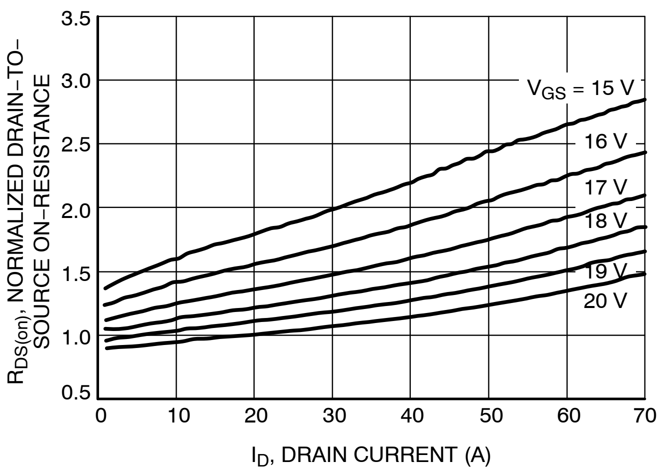


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

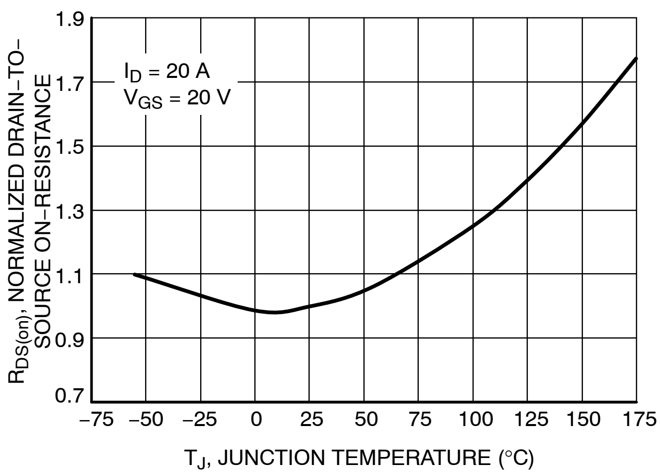


Figure 3. On−Resistance Variation with Temperature

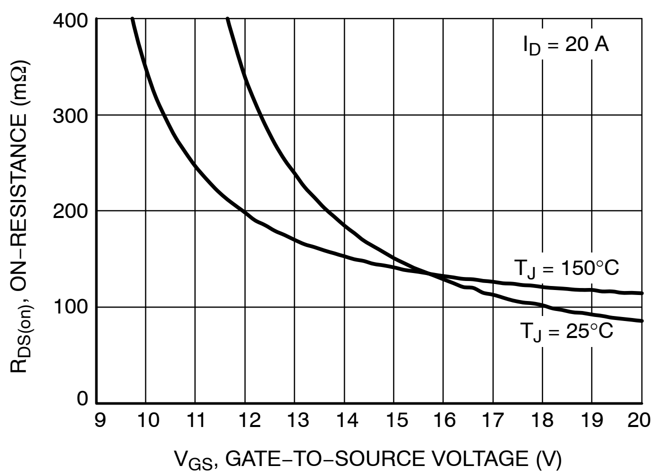


Figure 4. On−Resistance vs. Gate−to−Source Voltage

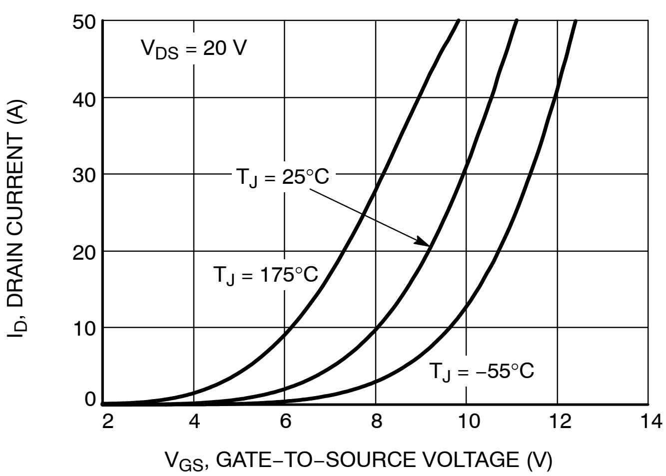


Figure 5. Transfer Characteristics

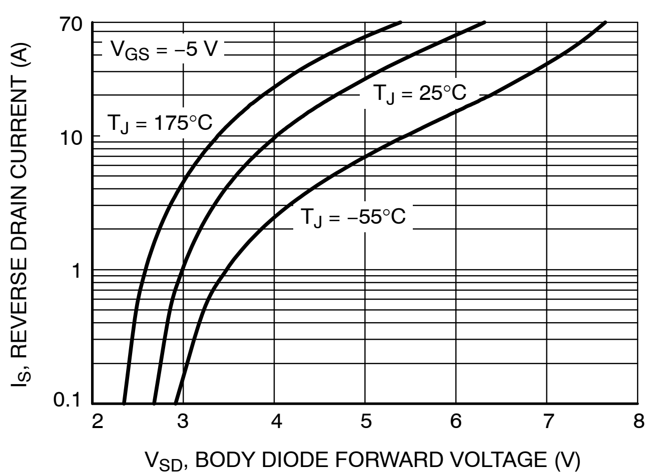


Figure 6. Diode Forward Voltage vs. Current

TYPICAL CHARACTERISTICS (continued)

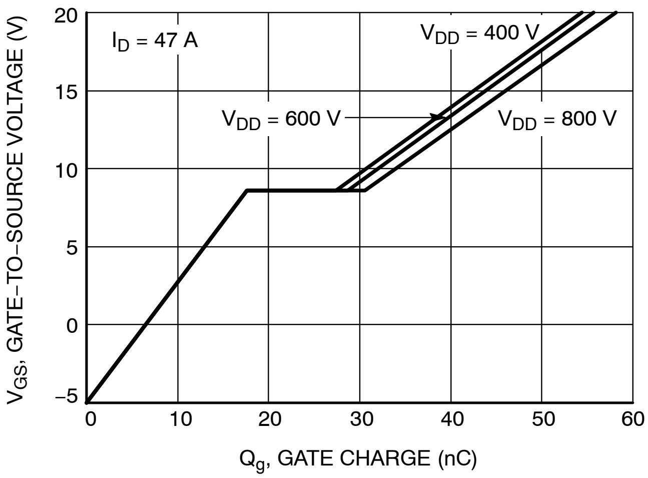


Figure 7. Gate−to−Source Voltage vs. Total Charge

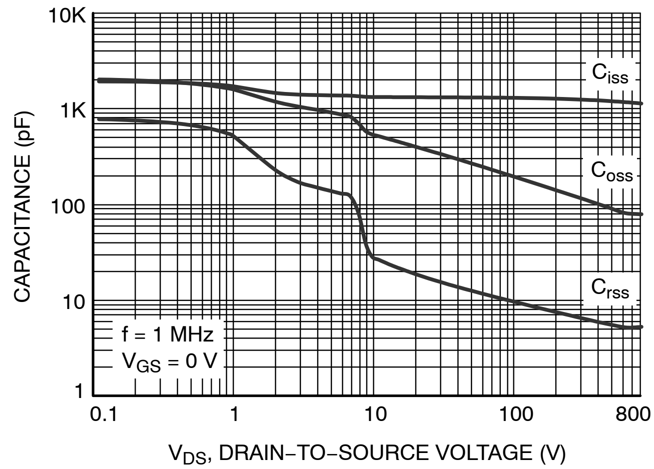


Figure 8. Capacitance vs. Drain−to−Source Voltage

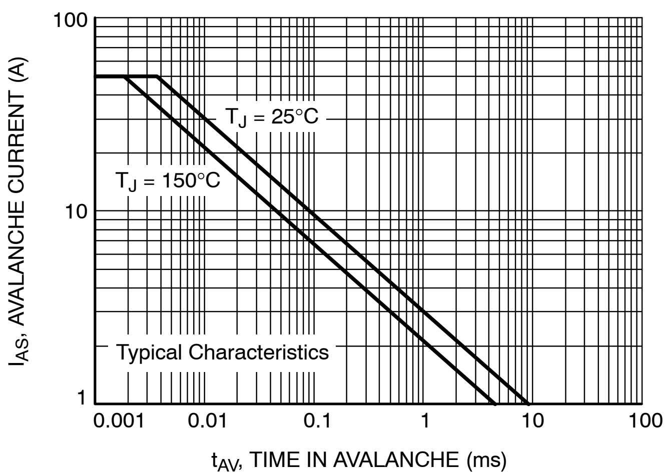


Figure 9. Unclamped Inductive Switching Capability

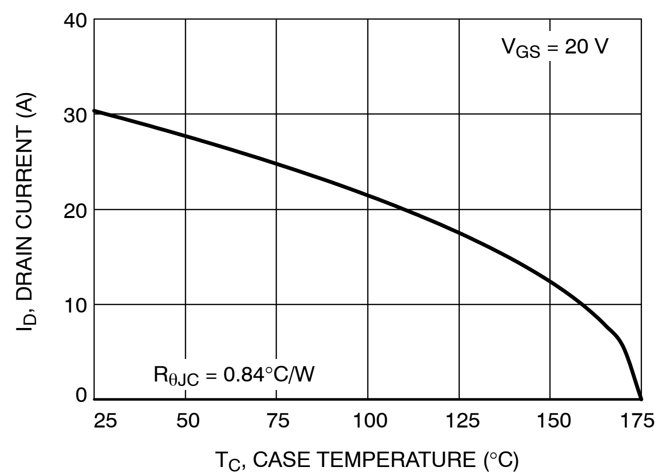


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

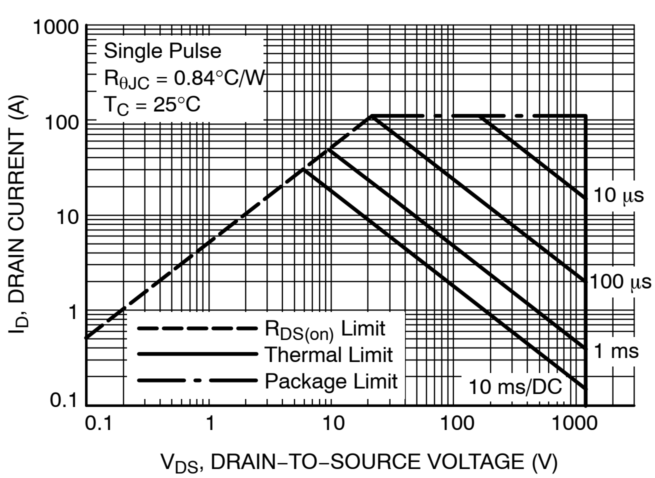


Figure 11. Safe Operating Area

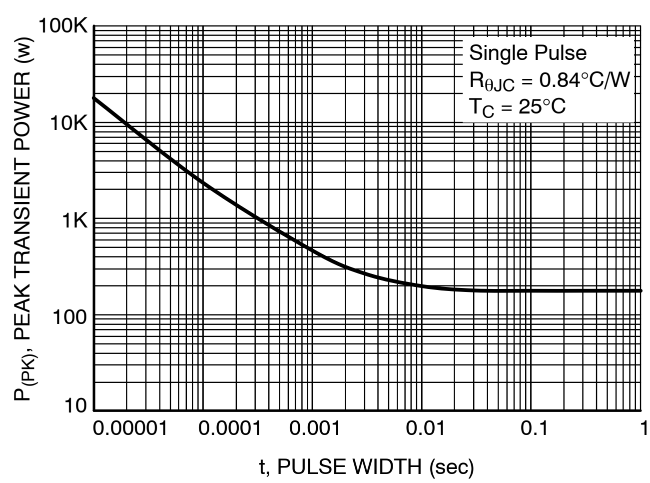


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

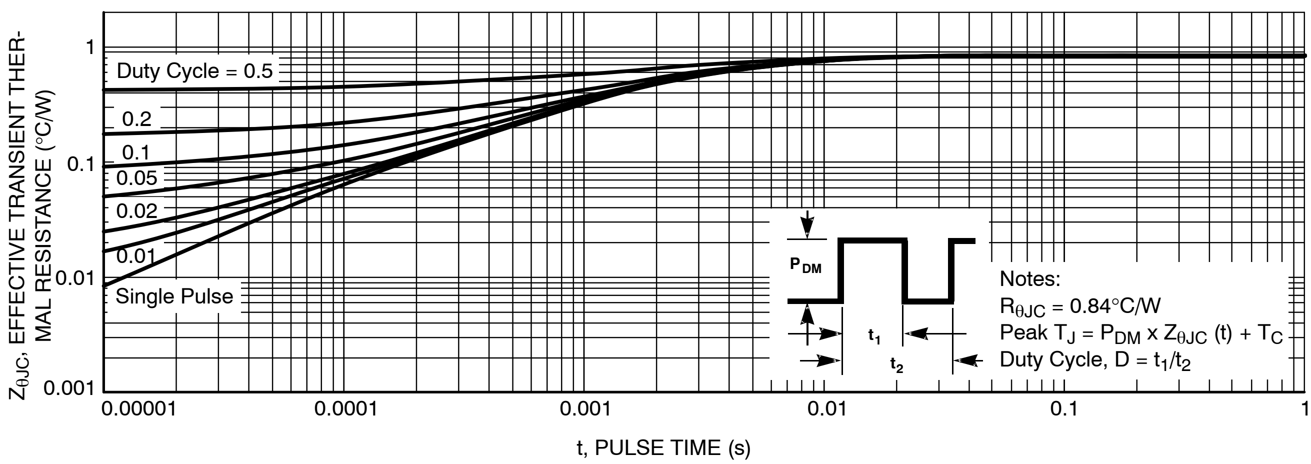
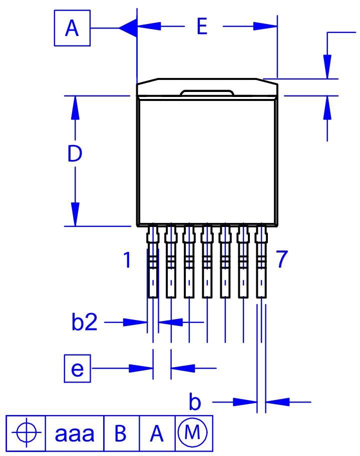
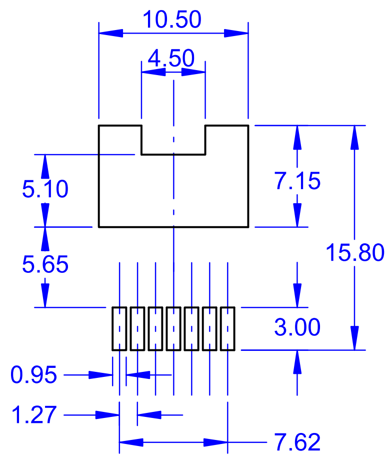


Figure 13. Junction−to−Case Transient Thermal Response Curve

D2PAK7 (TO−263−7L HV)
CASE 418BJ
ISSUE B

DATE 16 AUG 2019



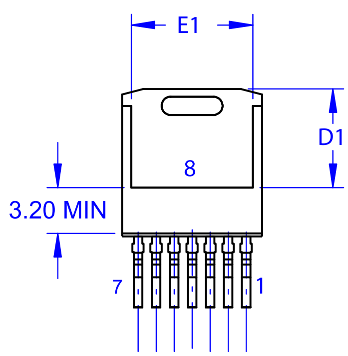


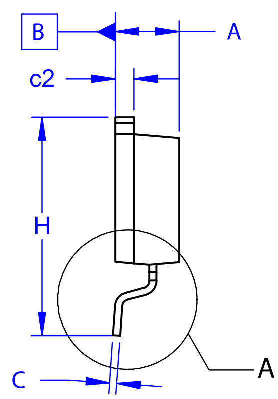
LAND PATTERN RECOMMENDATION

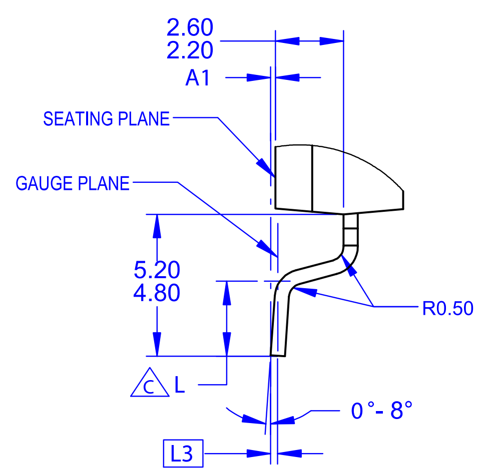
NOTES:

A. PACKAGE CONFORMS TO JEDEC TO-263 VARIATION CB EXCEPT WHERE NOTED.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. OUT OF JEDEC STANDARD VALUE.
D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
E. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	0.00	0.10	0.20
b2	0.60	0.70	0.80
b	0.51	0.60	0.70
c	0.40	0.50	0.60
c2	1.20	1.30	1.40
D	9.00	9.20	9.40
D1	6.15	6.80	7.15
E	9.70	9.90	10.20
E1	7.15	7.65	8.15
e	~	1.27	~
H	15.10	15.40	15.70
L	2.44	2.64	2.84
L1	1.00	1.20	1.40
L3	~	0.25	~
aaa	~	~	0.25

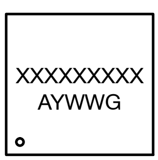






DETAIL A
SCALE 2:1

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
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.

DOCUMENT NUMBER:	**98AON84234G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**D2PAK7 (TO−263−7L HV)**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

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North American Technical Support:
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Phone: 011 421 33 790 2910

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Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative