NTBG160N120SC1

Product Preview

N-Channel Silicon Carbide MOSFET

1200 V, 161 mΩ, 31 A

ON Semiconductor®

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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}	±20	V
Continuous Drain Current $R_{\theta JC}$	T_C = 25°C	I_{DC}	31.0	A
Power Dissipation $R_{\theta JC}$		P_{DC}	238	W
Continuous Drain Current $R_{\theta JC}$	T_C = 100°C	I_{DC}	21.9	A
Power Dissipation $R_{\theta JC}$		P_{DC}	119	W
Continuous Drain Current $R_{\theta JA}$	T_A = 25°C	I_{DA}	TBD	A
Power Dissipation $R_{\theta JA}$		P_{DA}	TBD	W
Continuous Drain Current $R_{\theta JA}$	T_A = 100°C	I_{DA}	TBD	A
Power Dissipation $R_{\theta JA}$		P_{DA}	TBD	W
Pulsed Drain Current $R_{\theta JC}$	T_C = 25°C, t_p = 10 μs	I_{DM}	126	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)		I_S	50.4	A
Single Pulse Avalanche Energy (T_J = 25°C, V_{GS} = 20 V, I_{LPK} = 1 A, L = 0.1 mH, R_G = 25 Ω)		E_{AS}	TBD	mJ
Lead Temperature for Soldering Purposes		T_L	TBD	°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.

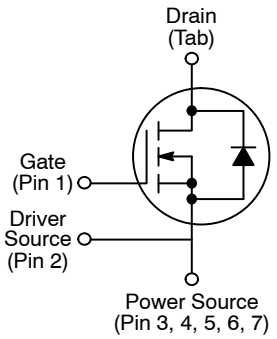
THERMAL CHARACTERISTICS

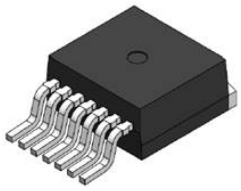
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.63	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	TBD	

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
1200 V	161 mΩ @ 20 V	31 A

N−CHANNEL MOSFET





D2PAK−7L
CASE 418AY

ORDERING INFORMATION

Device	Package	Shipping
NTBG160N120SC1	D2PAK	TBD

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ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 2.50e − 04A, T_C = 25°C	1200	−	−	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSSTj}$	V_{GS} = 0 V, I_D = 2.50e − 04A, T_{Jmax} = 175°C	−	0.25	−	V/°C
Zero Gate Voltage Drain Current	I_{DSS}	T_C = 25°C	−	−	10.0	μA
		T_C = 175°C	−	−	250	
Gate−to−Source Leakage Current	I_{GSS}	V_G = 20 V, V_D = 0 V	−	−	250	nA
ON CHARACTERISTICS						
Drain−to−Source On Resistance	$R_{DS(on)}$	V_G = 20 V, I_D = 9.90 A	−	161	−	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_G = V_D, I_D = 2.48e − 03A	−	2.83	−	V
Gate Threshold Voltage Temperature Coefficient	$V_{GS(th)}/T_J$		−	−5.37	−	mV/°C
Forward Transconductance	g_{FS}	V_D = 10.0 V, I_D = 9.90 A	−	3.91	−	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Gate Resistance	R_G	V_G = 0 V, V_D = 1000 V	−	3.05	−	Ω
Input Capacitance	C_{ISS}		−	690	−	pF
Reverse Transfer Capacitance	C_{RSS}		−	1.92	−	
Output Capacitance	C_{OSS}		−	39.1	−	
Effective Output Capacitance	C_{OSSef}	V_{DS} = 0 to 1000 V, V_G = 0 V	−	65.4	−	
Energy Related Output Capacitance	C_{OSSer}		−	47.4	−	
Coss Stored Energy	E_{OSS}		−	23.7	−	μJ
Total Gate Charge	$Q_{G(tot)}$	V_D = 800 V, I_D = 4.95 A, V_G = 20 V	−	24.1	−	nC
Gate−to−Source Charge	Q_{GS}		−	5.95	−	
Gate−to−Drain Charge	Q_{GD}		−	5.71	−	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(on)}$	V_G = −5/20 V, I_D = 9.9 A, V_D = 800 V, R_G = 2 Ω	−	8.17	−	ns
Turn-Off Delay Time	$t_{d(off)}$		−	9.40	−	
Rise Time	t_r		−	2.27	−	
Fall Time	t_f		−	7.68	−	
Turn-On Switching Loss	E_{ON}		−	0.06	−	mJ
Turn-Off Switching Loss	E_{OFF}		−	0.02	−	
Total Switching Loss	E_{TOT}		−	0.08	−	
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	I_D = 4.95 A	−	3.87	−	V
Reverse Recovery Time	t_{RR}	I_D = 9.9 A, dI/dt = 1000 A/μs, V_{DS} = 800 V, V_{GS} = −5/20 V	−	22.3	−	ns
Reverse Recovery Charge	Q_{RR}		−	75.6	−	nC
Reverse Recovery Energy	E_{REC}		−	19.6	−	μJ
Peak Reverse Recovery Current	I_{RRM}		−	5.23	−	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

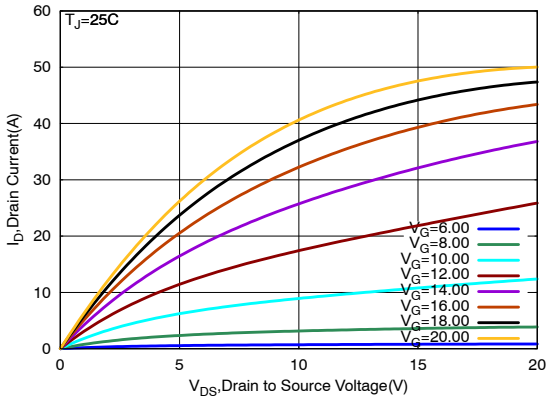


Figure 1. On−Region Characteristics

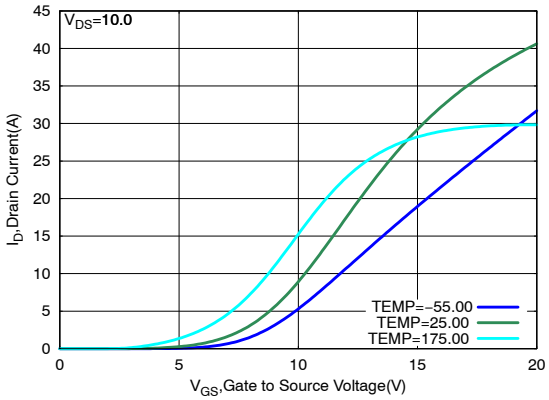


Figure 2. Transfer Characteristics

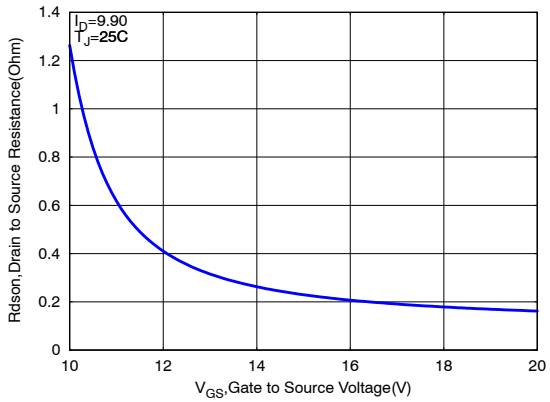


Figure 3. On−Resistance vs. VGS

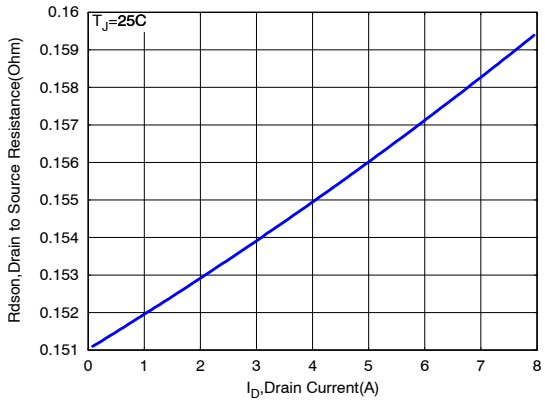


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

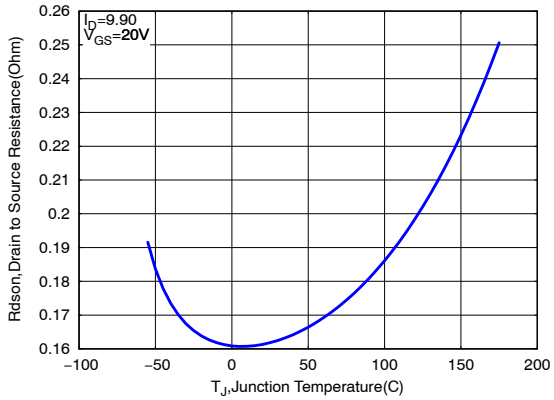


Figure 5. On−Resistance Variation with Temperature

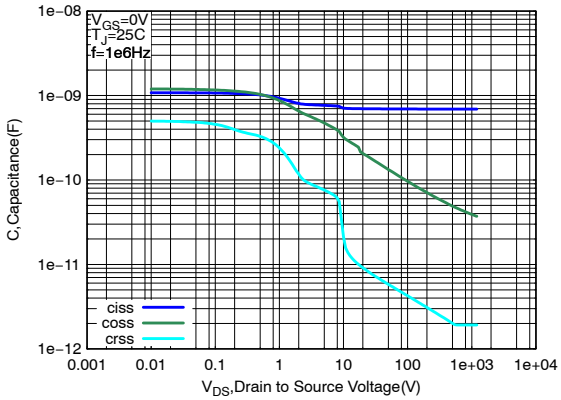


Figure 6. Capacitance Variation

TYPICAL CHARACTERISTICS

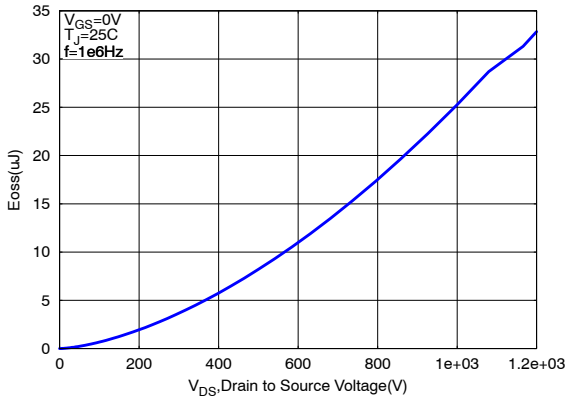


Figure 7. Eoss vs. Drain−to−Source Voltage

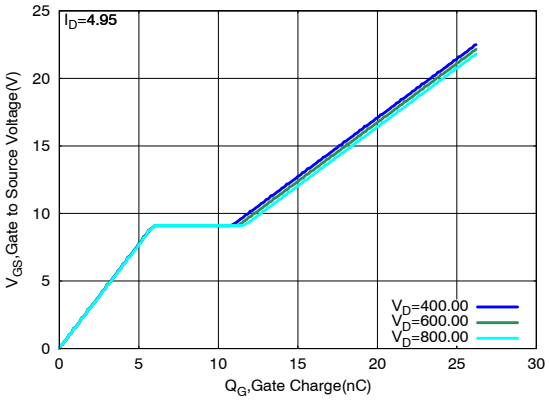


Figure 8. Gate−to−Source Voltage vs. Total Charge

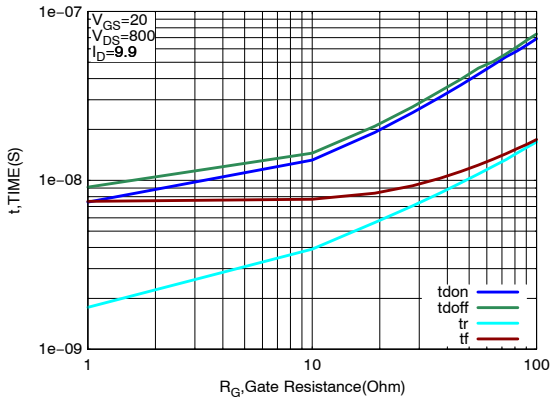


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

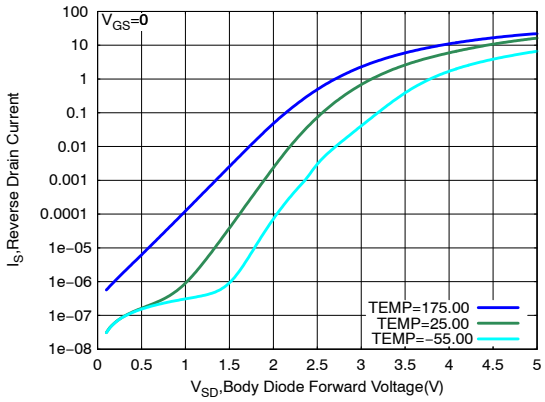


Figure 10. Diode Forward Voltage vs. Current

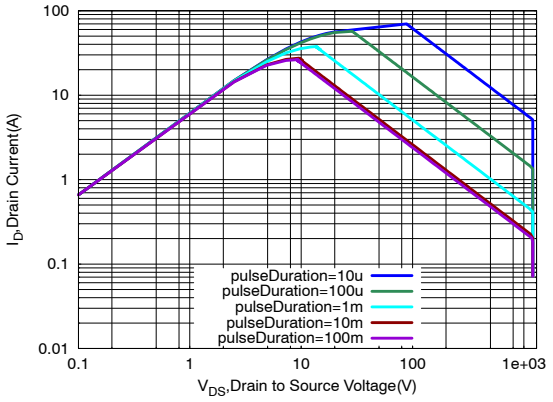


Figure 11. Maximum Rated Forward Biased Safe Operating Area

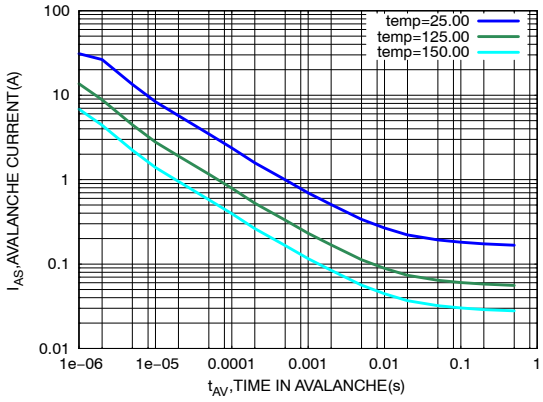


Figure 12. Ipeak vs. Time in Avalanche

TYPICAL CHARACTERISTICS

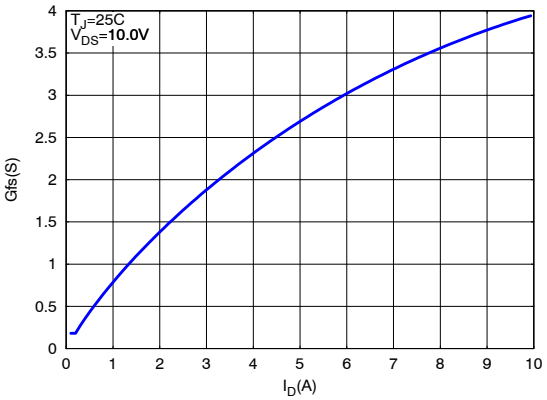


Figure 13. GFS vs. ID

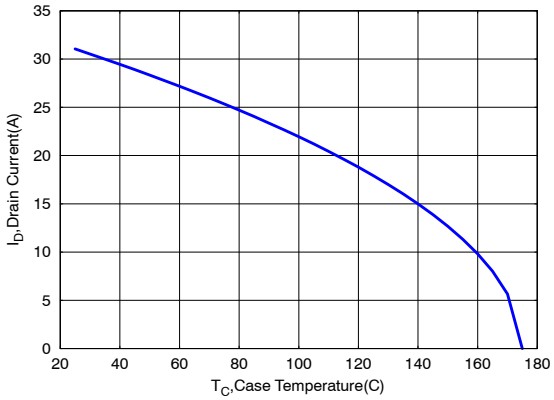


Figure 14. Maximum Current vs. Case Temperature

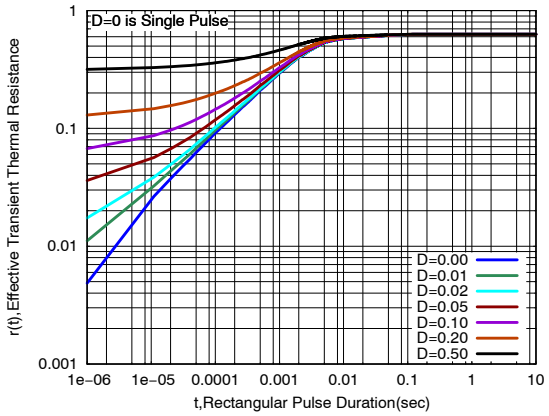
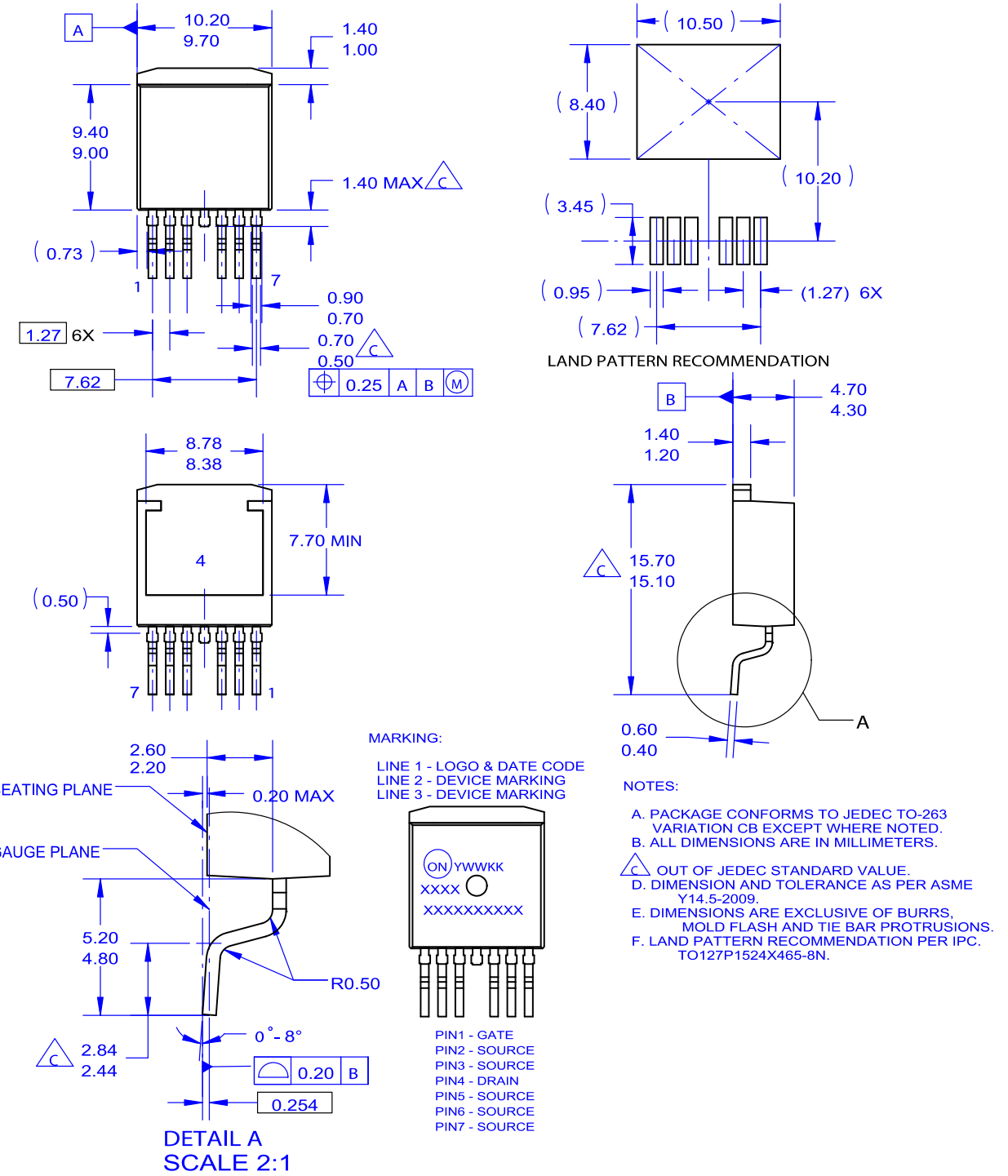


Figure 15. Thermal Response

PACKAGE DIMENSIONS

D2PAK7 (TO−263 7 LD)
CASE 418AY
ISSUE A



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.
F. LAND PATTERN RECOMMENDATION PER IPC. TO127P1524X465-8N.

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