MOSFET - Power, Single N-Channel, D^{2}PAK7

60 V, 1.1 mΩ, 342 A

NTBGS001N06C

ON Semiconductor®

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Features

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

Typical Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

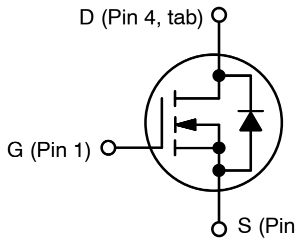
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	60	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	T_C = 25°C	I_D	342	A
Power Dissipation $R_{\theta JC}$ (Note 2)			P_D	245	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	42	A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)			P_D	3.7	W
Pulsed Drain Current	T_A = 25°C, t_p = 100 μs		I_{DM}	1724	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	204	A
Single Pulse Drain−to−Source Avalanche Energy (I_L = 44.1 A_{pk}, L = 1 mH)			E_{AS}	973	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.

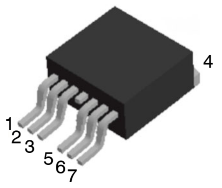
1. Surface−mounted on FR4 board using a 1 in^2, 1 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
60 V	1.1 mΩ @ 12 V 1.2 mΩ @ 10 V	342 A



1. Gate
2. Source
3. Source
4. Drain
5. Source
6. Source
7. Source

N−CHANNEL MOSFET



D^{2}PAK7
CASE 221BP

MARKING DIAGRAM

BGS001
N06C
AYWWG

BGS001N06C	= Specific Device Code
A	= Assembly Location
Y	= Year
WW	= Work Week
G	= Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
NTBGS001N06C	D^{2}PAK7 (Pb−Free)	800 / 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.

November, 2020 − Rev. 1

Publication Order Number:
NTBGS001N06C/D

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	$R_{\theta JC}$	0.61	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	40	

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

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		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 562 μA, ref to 25°C			10		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			10	μA
			T_J = 125°C			100	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 562 μA		2.0	3.0	4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 562 μA, ref to 25°C			−9.5		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 12 V, I_D = 112 A			0.89	1.1	mΩ
		V_{GS} = 10 V, I_D = 56 A			0.93	1.2	
Gate−Resistance	R_G	T_A = 25°C			0.5		Ω
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, V_{DS} = 30 V, f = 500 kHz			11110		pF
Output Capacitance	C_{OSS}				6250		
Reverse Transfer Capacitance	C_{RSS}				54		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 30 V; I_D = 112 A			139		nC
Threshold Gate Charge	$Q_{G(TH)}$				27.3		
Gate−to−Source Charge	Q_{GS}				45.9		
Gate−to−Drain Charge	Q_{GD}				19.5		
Output Charge	Q_{OSS}	V_{GS} = 0 V, V_{DS} = 50 V			292		
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 112 A, R_G = 6 Ω			41.1		ns
Rise Time	t_r				23.3		
Turn−Off Delay Time	$t_{d(OFF)}$				92		
Fall Time	t_f				31.7		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 112 A	T_J = 25°C		0.84	1.2	V
			T_J = 125°C		0.72		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 56 A			112		ns
Reverse Recovery Charge	Q_{RR}				647		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. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

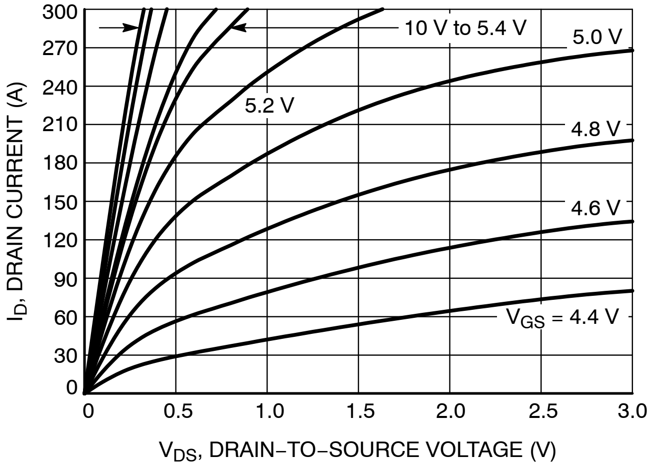


Figure 1. On−Region Characteristics

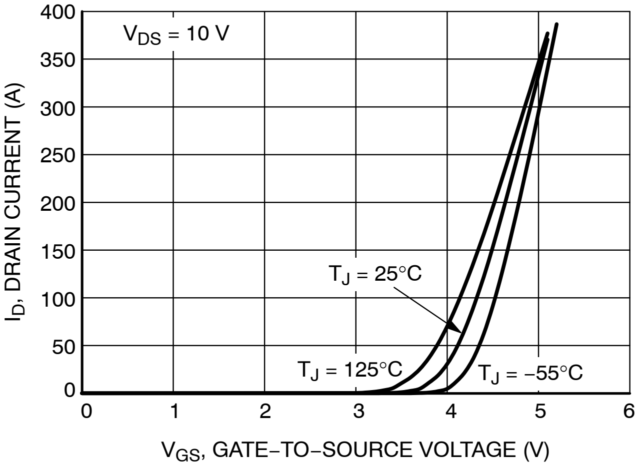


Figure 2. Transfer Characteristics

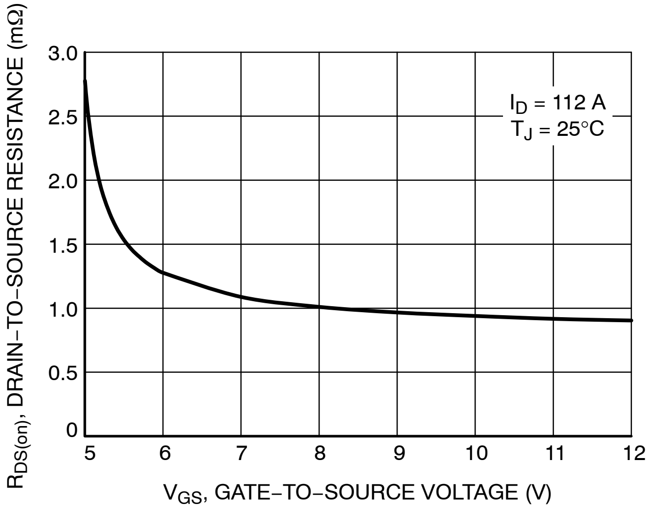


Figure 3. On−Resistance vs. Gate−to−Source Voltage

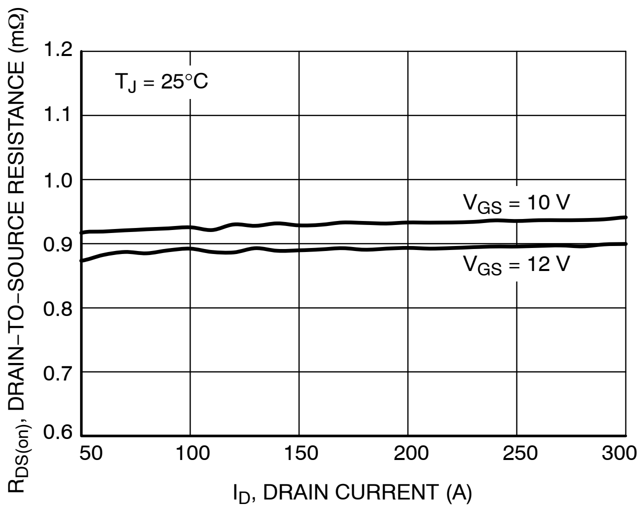


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

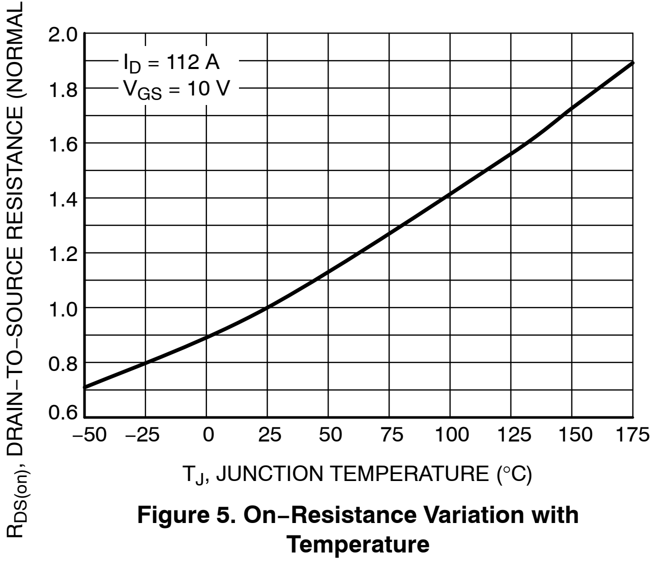


Figure 5. On−Resistance Variation with Temperature

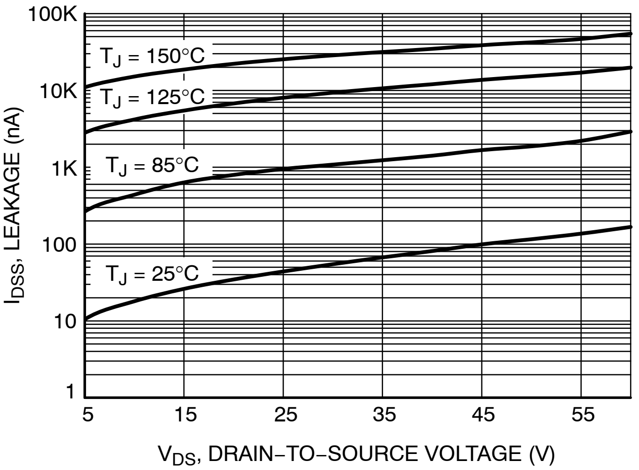


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

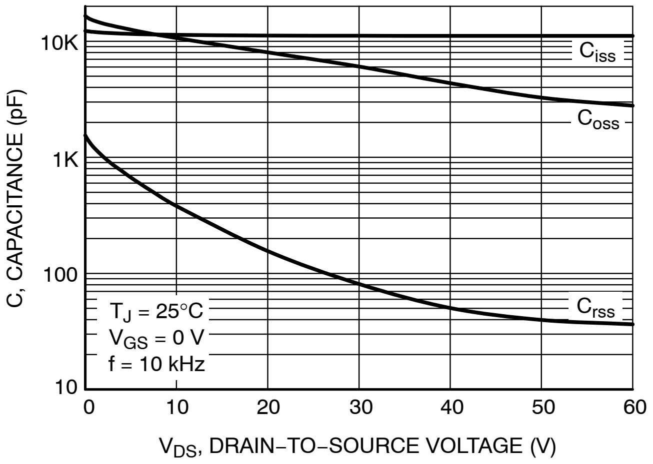


Figure 7. Capacitance Variation

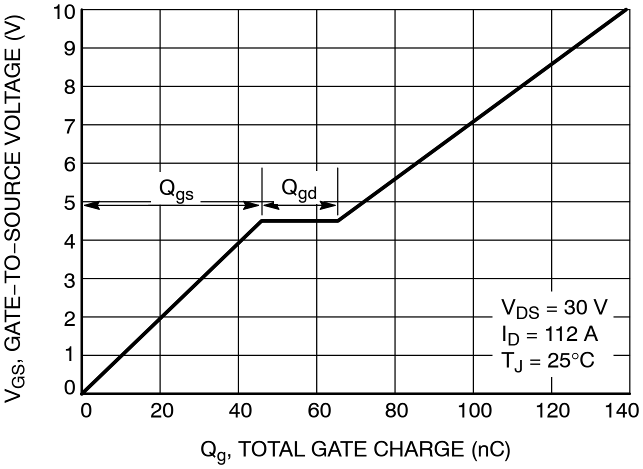


Figure 8. Gate−to−Source vs. Total Charge

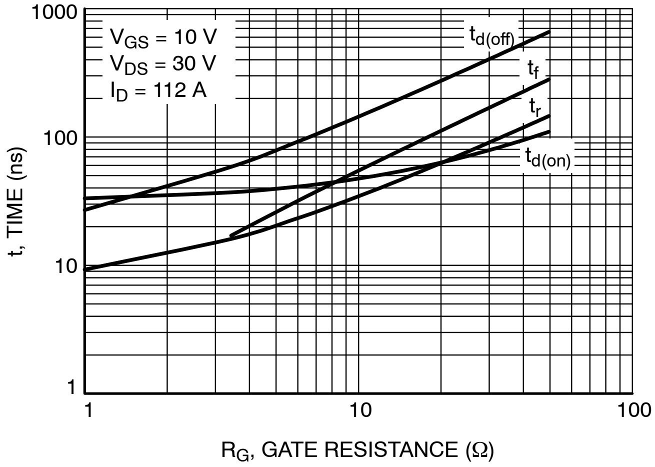


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

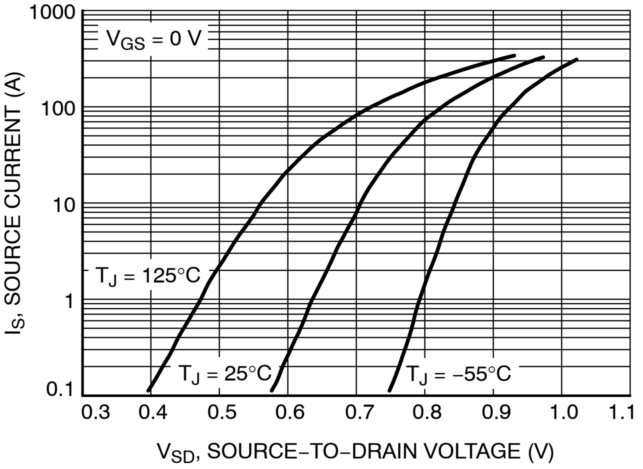


Figure 10. Diode Forward Voltage vs. Current

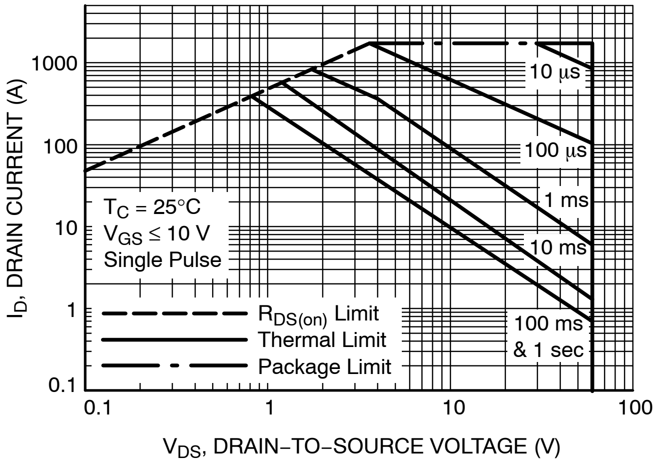


Figure 11. Maximum Rated Forward Biased Safe Operating Area

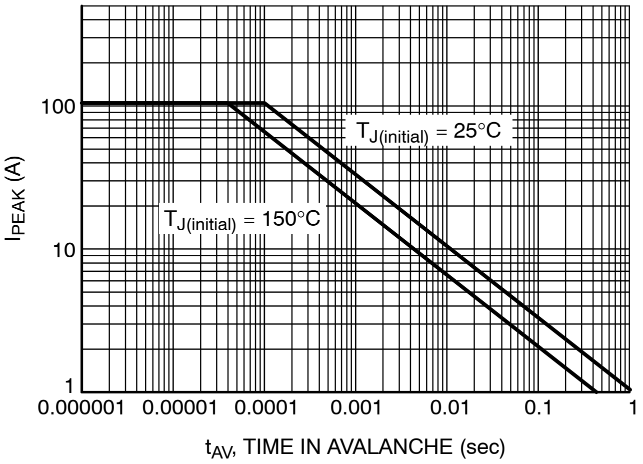


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

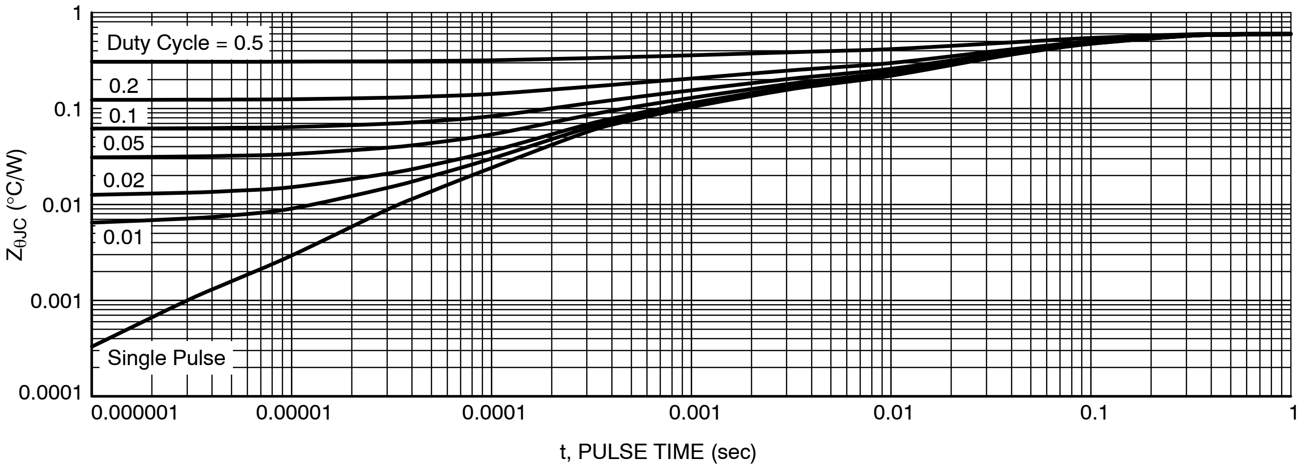
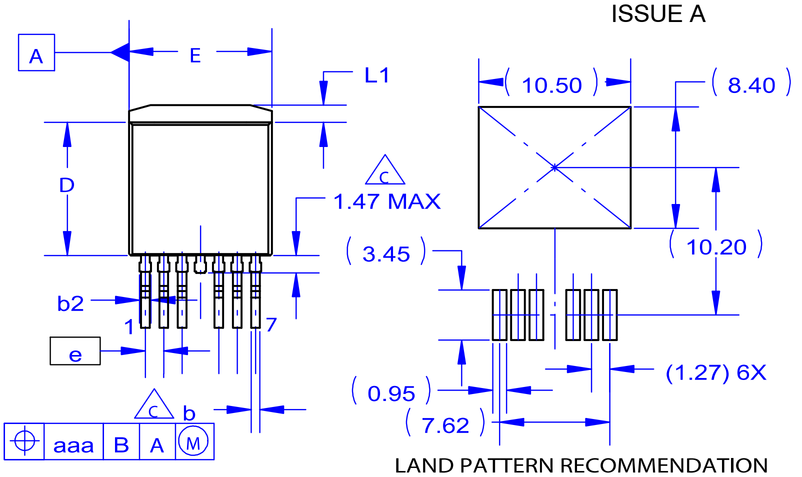


Figure 13. Transient Thermal Impedance

PACKAGE DIMENSIONS

D2PAK7 (TO−263−7LD) 15.4x9.9x4.5
CASE 221BP
ISSUE A

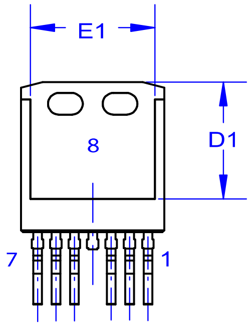


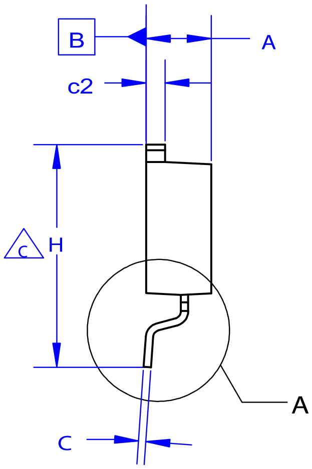
LAND PATTERN RECOMMENDATION

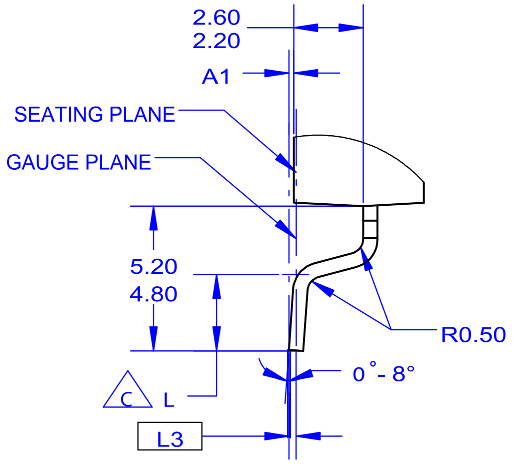
NOTES:

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

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	0.50	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	7.30	7.80	8.20
E	9.70	9.90	10.20
E1	7.15	8.05	8.55
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

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