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

100 V, 4.1 mΩ, 203 A

NTBGS004N10G

ON Semiconductor®

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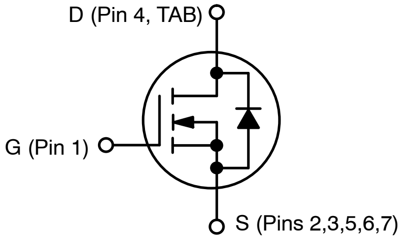
Features

- Low $R_{DS(on)}$
- High Current Capability
- Wide SOA
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Hot Swap in 48 V Systems

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
100 V	4.1 mΩ @ 10 V	203 A



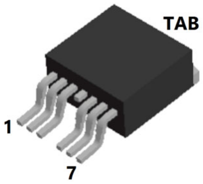
N−CHANNEL MOSFET

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	100	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	203	A
Power Dissipation $R_{\theta JC}$ (Note 2)			P_D	340	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	21	A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)			P_D	3.7	W
Pulsed Drain Current	T_A = 25°C, t_p = 10 µs		I_{DM}	2983	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to + 175	°C
Source Current (Body Diode)			I_S	283	A
Single Pulse Drain−to−Source Avalanche Energy (I_L = 106 A_{pk}, L = 0.1 mH)			E_{AS}	561	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.



D^2PAK7
CASE 418AY

MARKING DIAGRAM

A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code
NTBGS004N10G = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
NTBGS004N10G	D^2PAK7 (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.

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THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	$R_{\theta JC}$	0.44	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	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		100			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			81.3		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 80 V	T_J = 25°C			1.0	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 = 500 μA		2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 500 μA, ref to 25°C			−9.3		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 100 A			3.0	4.1	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 100 A			71		S
Gate−Resistance	R_G	T_A = 25°C			0.42		Ω
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, V_{DS} = 50 V, f = 1 MHz			12100		pF
Output Capacitance	C_{OSS}				1170		
Reverse Transfer Capacitance	C_{RSS}				165		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 50 V; I_D = 100 A			178		nC
Threshold Gate Charge	$Q_{G(TH)}$				79		
Gate−to−Source Charge	Q_{GS}				66		
Gate−to−Drain Charge	Q_{GD}				43		
Plateau Voltage	V_{GP}				6.0		V
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 50 V, I_D = 100 A, R_G = 4.7 Ω			44		ns
Rise Time	t_r				41		
Turn−Off Delay Time	$t_{d(OFF)}$				81		
Fall Time	t_f				29		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 100 A	T_J = 25°C		0.88	1.2	V
			T_J = 125°C		0.77		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 50 A			74		ns
Charge Time	t_a				46		
Discharge Time	t_b				29		
Reverse Recovery Charge	Q_{RR}				151		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

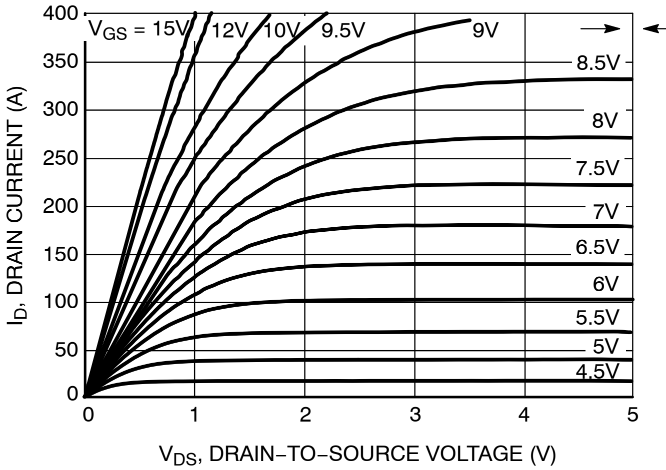


Figure 1. On−Region Characteristics

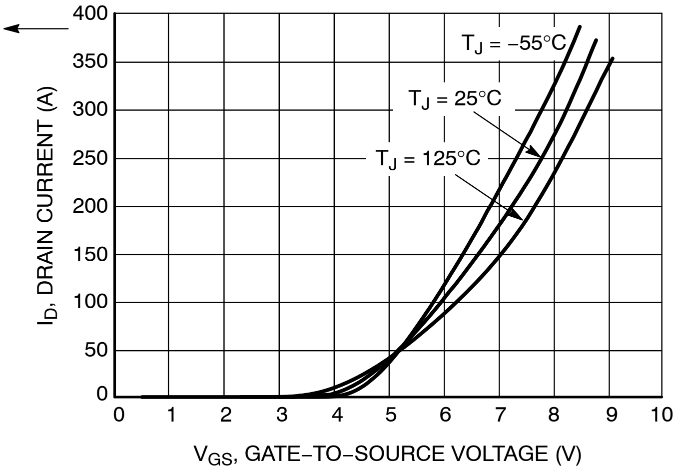


Figure 2. Transfer Characteristics

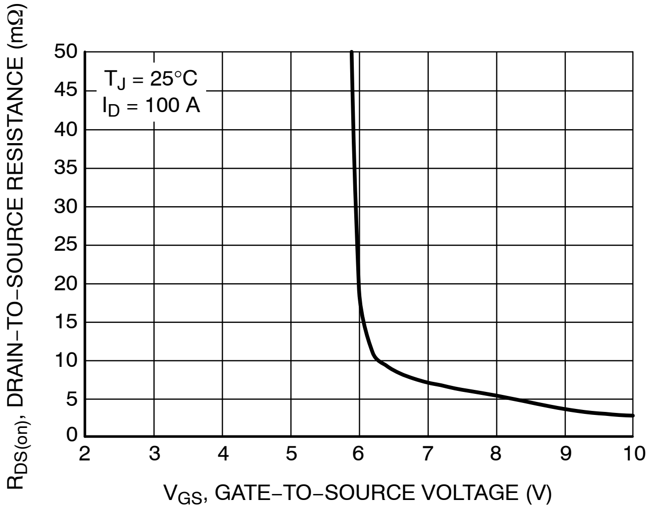


Figure 3. On−Resistance vs. Gate−to−Source Voltage

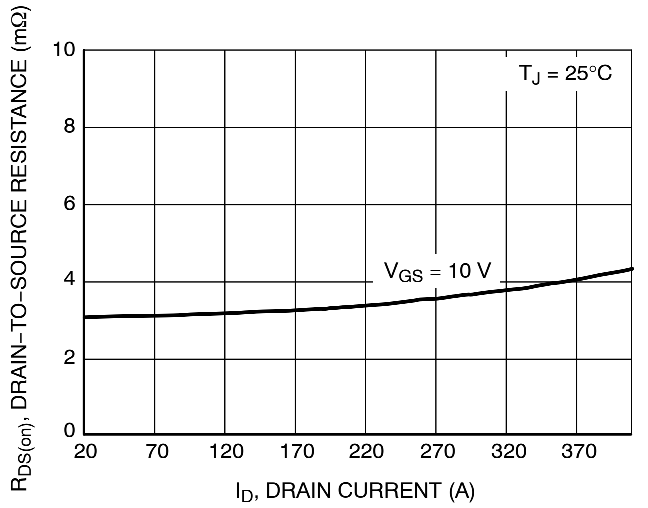


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

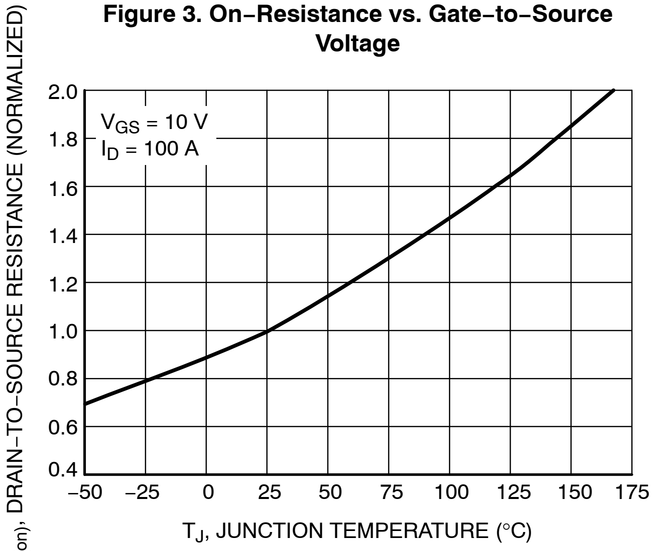


Figure 5. On−Resistance Variation with Temperature

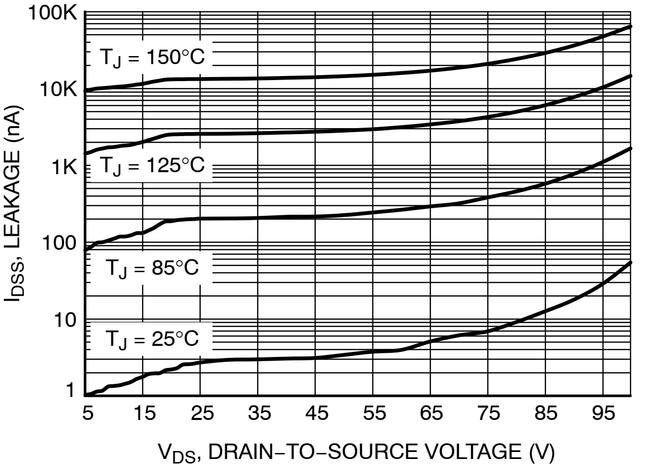


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

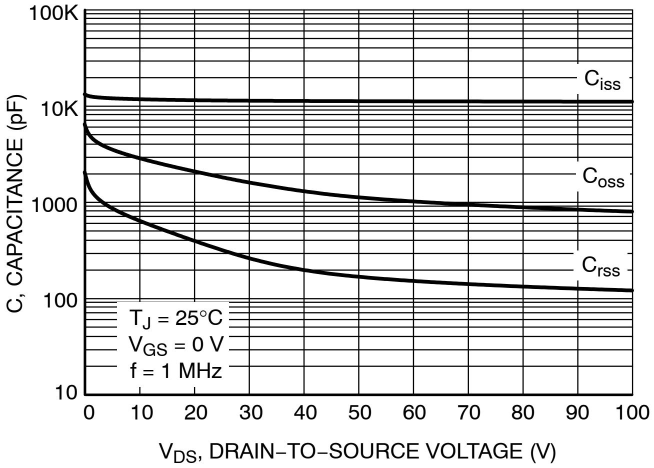


Figure 7. Capacitance Variation

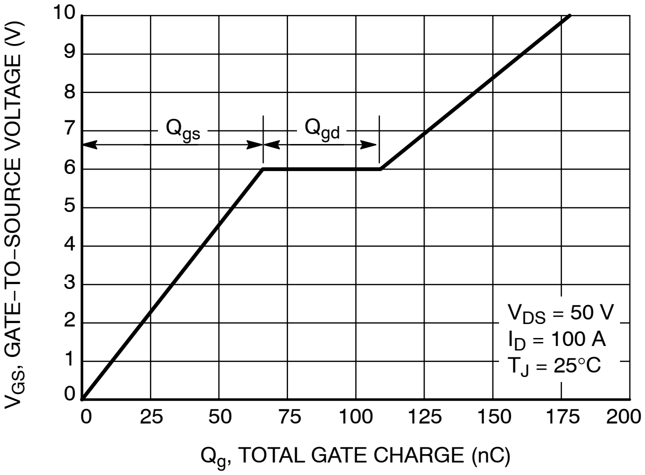


Figure 8. Gate−to−Source vs. Total Charge

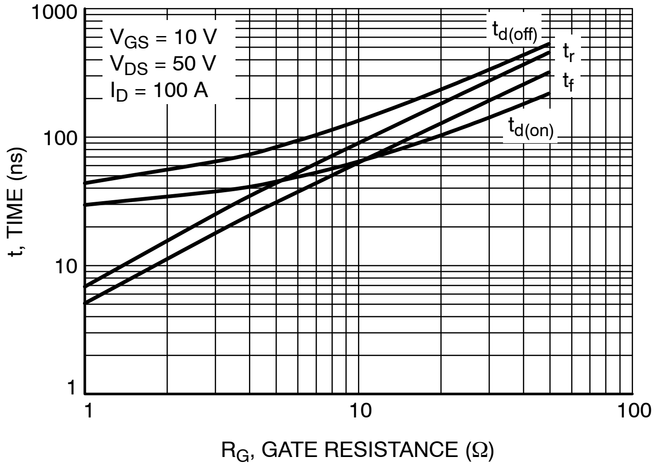


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

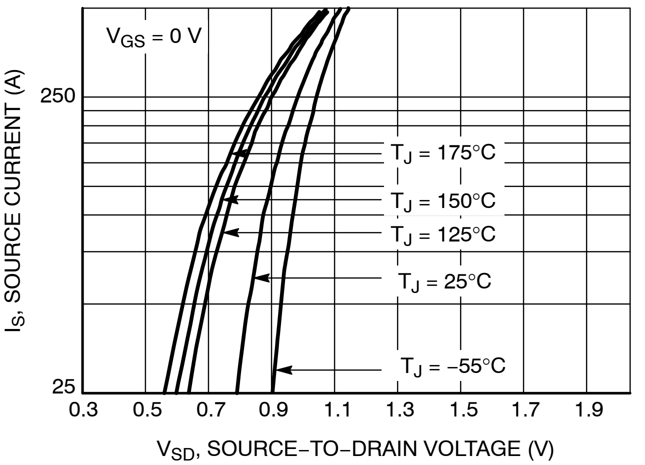


Figure 10. Diode Forward Voltage vs. Current

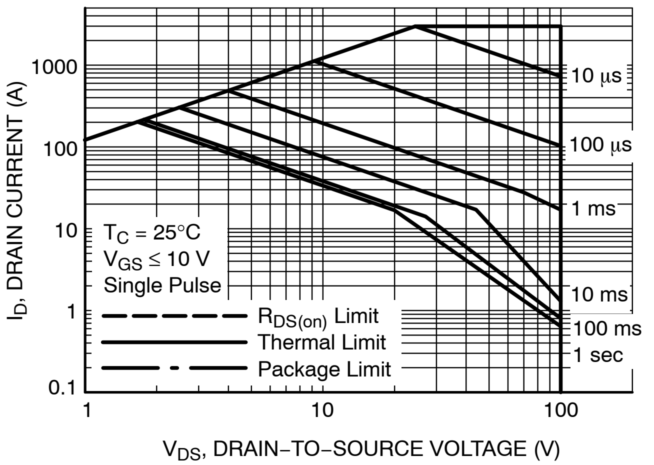


Figure 11. Maximum Rated Forward Biased Safe Operating Area

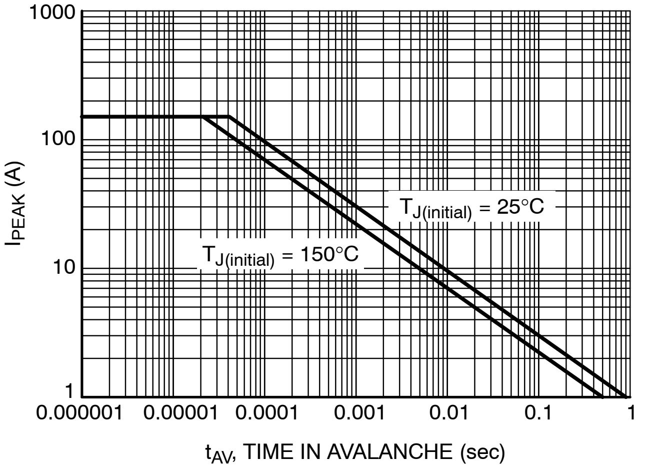


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

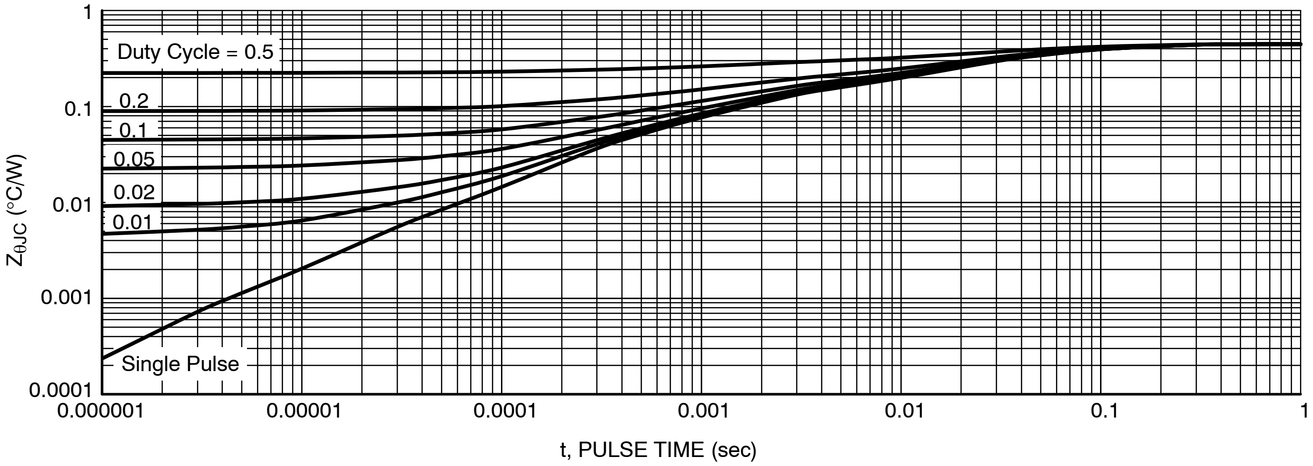
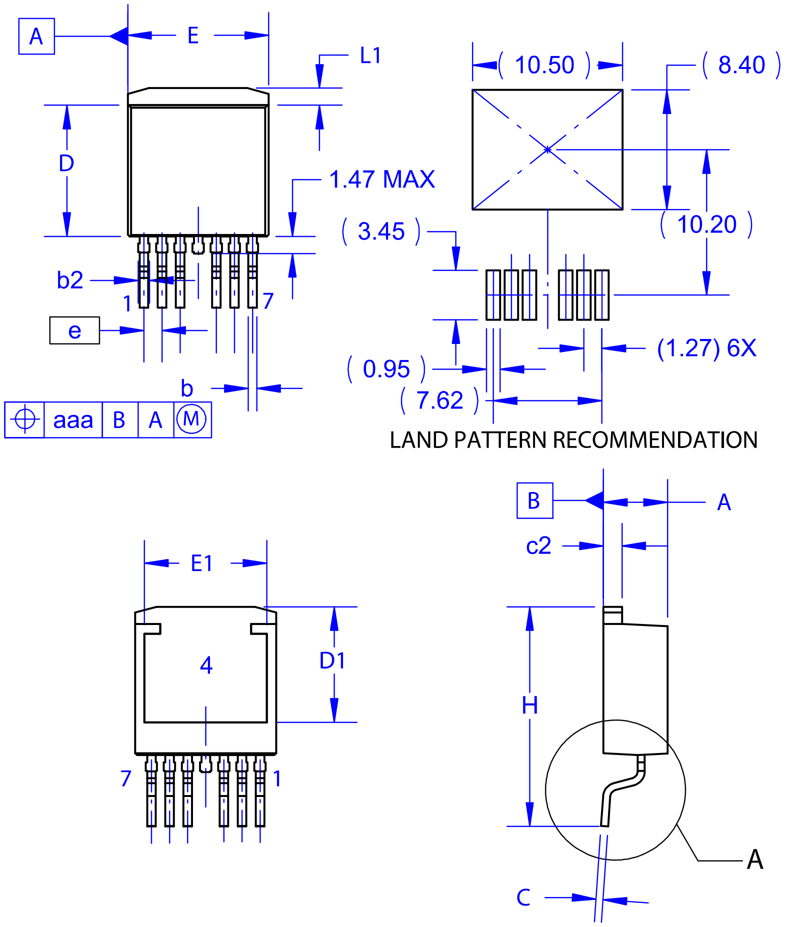


Figure 13. Transient Thermal Impedance

PACKAGE DIMENSIONS

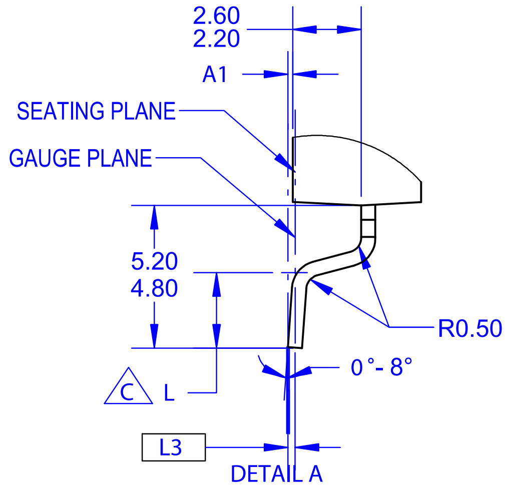
D^{2}PAK7 (TO−263 7 LD)
CASE 418AY
ISSUE C



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 Y14.5-1994.
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	0.70	0.80	0.90
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	7.70	~	~
E	9.70	9.90	10.20
E1	8.38	8.58	8.78
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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