MOSFET - Power, Single N-Channel, WDFN6

30 V, 6.1 mΩ, 15.9 A

Product Preview

NTLJS4D9N03H

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Features

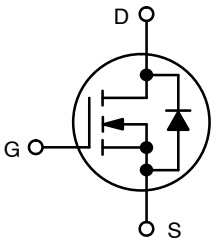
- Small Footprint (4 mm^2) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb−Free, Halogen−Free/BFR−Free and are RoHS Compliant

Applications

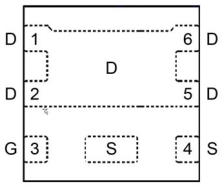
- DC−DC Converters
- Wireless Chargers
- Power Load Switch
- Power Management and Protection
- Battery Management

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
30 V	6.1 mΩ @ 4.5 V	15.9 A

ELECTRICAL CONNECTION



N−CHANNEL MOSFET



(Top View)

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3)	Steady State	T_A = 25°C	I_D	15.9	A
		T_A = 85°C		11.5	
Power Dissipation $R_{\theta JA}$ (Notes 1, 3)		T_A = 25°C	P_D	2.40	W
Continuous Drain Current $R_{\theta JA}$ (Notes 2, 3)	Steady State	T_A = 25°C	I_D	9.5	A
		T_A = 85°C		6.9	
Power Dissipation $R_{\theta JA}$ (Notes 2, 3)		T_A = 25°C	P_D	0.86	W
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	64	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +150	°C
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

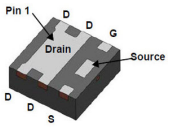
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	52	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	145	

1. Surface−mounted on FR4 board using 1 in^2 pad size, 2 oz. Cu pad.
2. Surface−mounted on FR4 board using minimum pad size, 2 oz. Cu pad.
3. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted. Actual continuous current will be limited by thermal & electro−mechanical application board design. $R_{\theta CA}$ is determined by the user's board design.

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



WDFN6 (2.05x2.05)
CASE 483AV

MARKING DIAGRAM

YW = Date Code
ZZ = Assembly Lot Code
A = Assembly Site Code
4D9 = Specific Device Code

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 2 of this data sheet.

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

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		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			20		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1	μA
			T_J = 125°C			10	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V				±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.2		2.1	V
Threshold Temperature Coefficient	V_{GS}/T_J	I_D = 250 μA, ref to 25°C			−4.9		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 10 A			4.7	6.1	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 10 A			51		S
Gate Resistance	R_G	T_A = 25°C			1		Ω
CHARGES AND CAPACITANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 15 V, f = 1.0 MHz			1020		pF
Output Capacitance	C_{oss}				415		
Reverse Transfer Capacitance	C_{rss}				20		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 10 A			6.8		nC
Threshold Gate Charge	$Q_{G(TH)}$				1.4		nC
Gate−to−Source Charge	Q_{GS}				2.5		
Gate−to−Drain Charge	Q_{GD}				1.5		
SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 5)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 4.5 V, V_{DD} = 15 V, I_D = 10 A, R_G = 6 Ω			11		ns
Rise Time	t_r				5.5		
Turn−Off Delay Time	$t_{d(off)}$				17		
Fall Time	t_f				5.7		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	T_J = 25°C		0.79	1.2	V
			T_J = 125°C		0.66		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 10 A			28		ns
Reverse Recovery Charge	Q_{RR}				11		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.

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NTLJS4D9N03HTAG	WDFN6 (Pb−Free)	3000 / 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.

TYPICAL CHARACTERISTICS

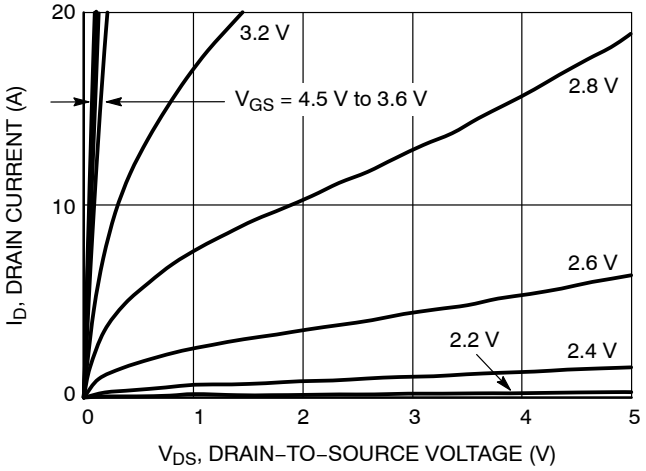


Figure 1. On−Region Characteristics

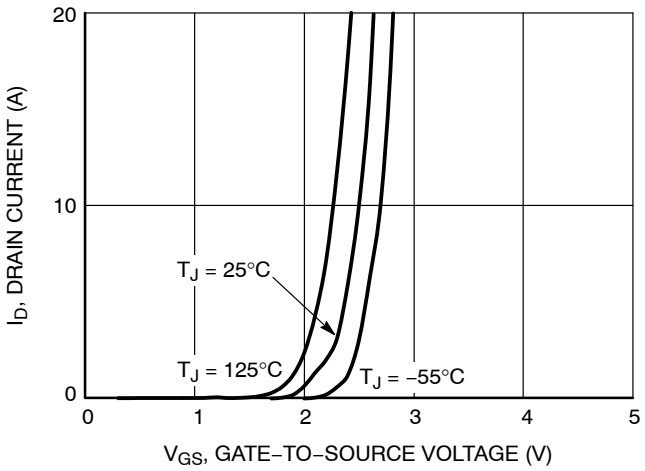


Figure 2. Transfer Characteristics

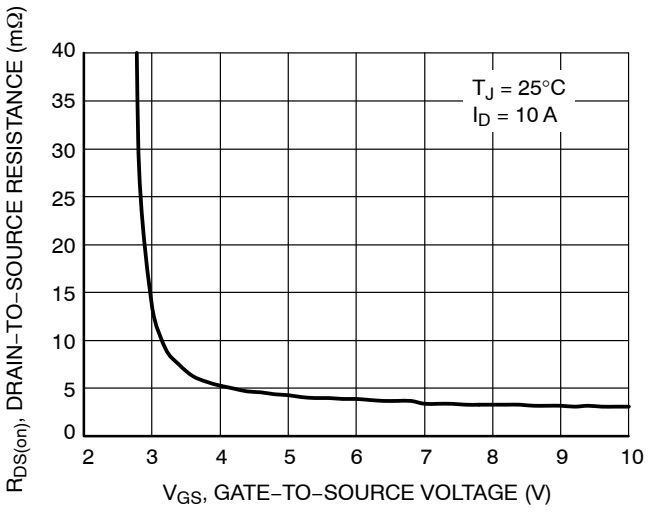


Figure 3. On−Resistance vs. Gate−to−Source Voltage

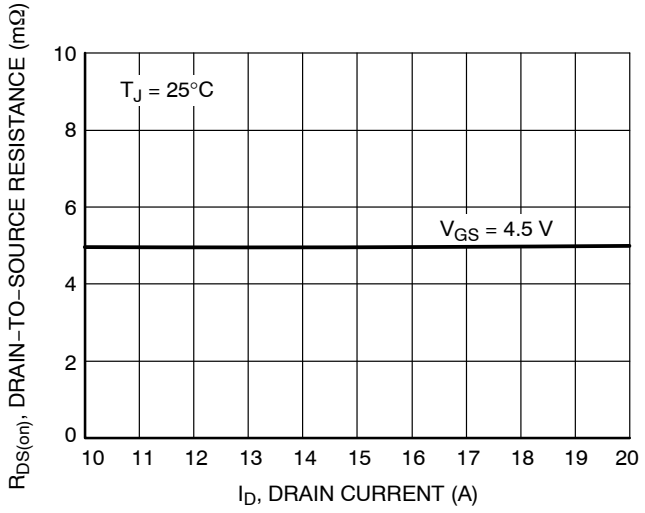


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

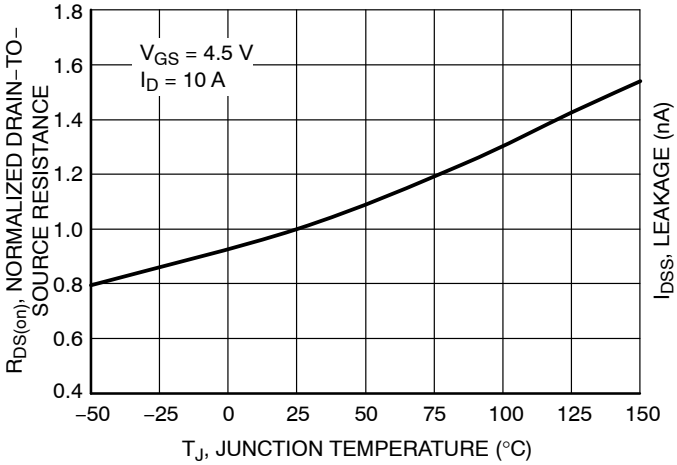


Figure 5. On−Resistance Variation with Temperature

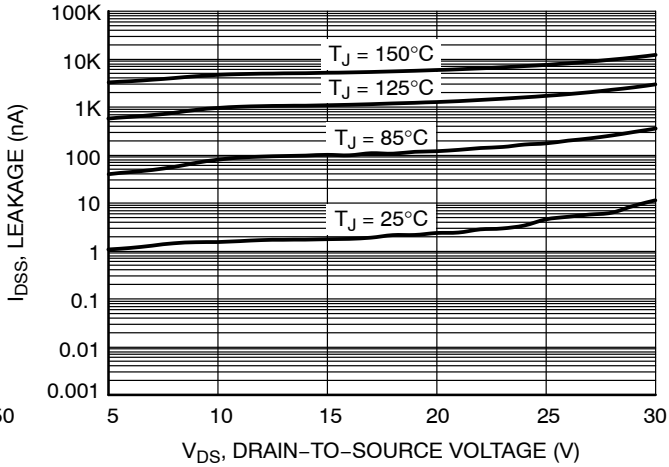


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

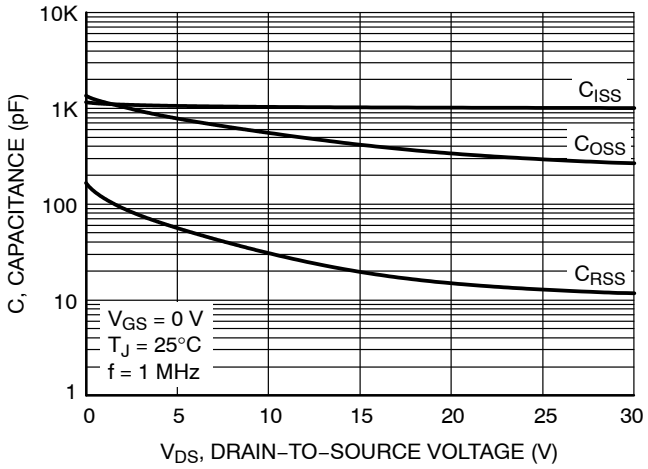


Figure 7. Capacitance Variation

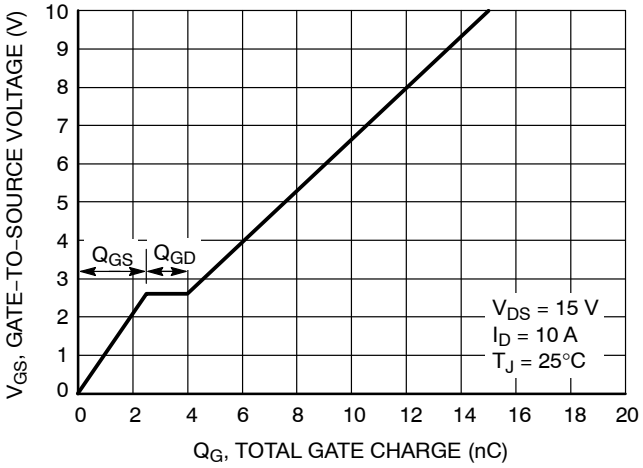


Figure 8. Gate−to−Source Voltage vs. Total Charge

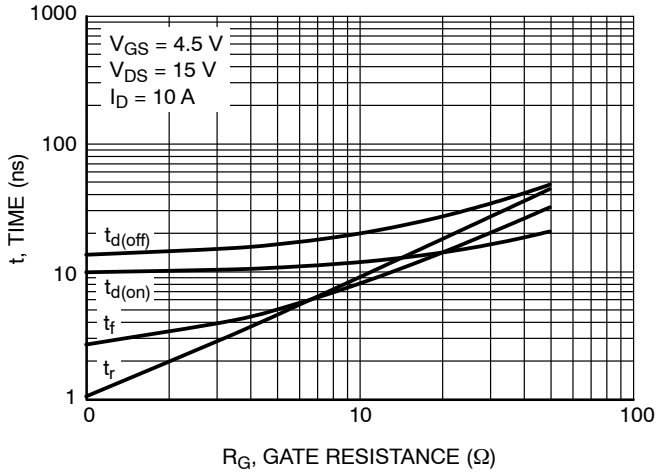


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

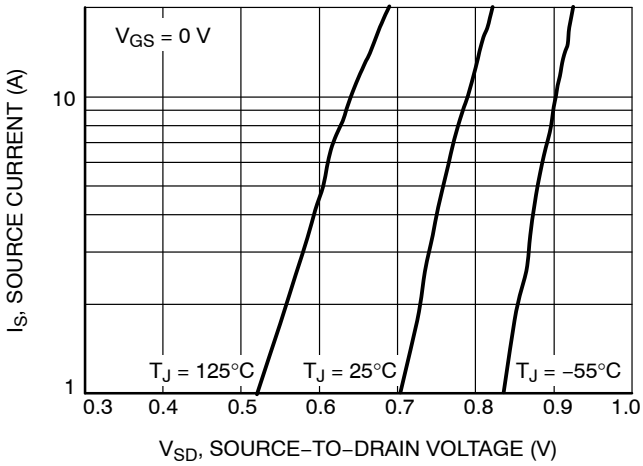


Figure 10. Diode Forward Voltage vs. Current

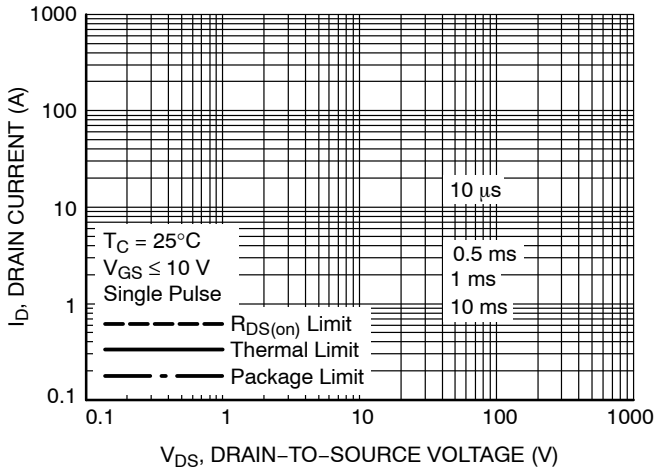


Figure 11. Maximum Rated Forward Biased Safe Operating Area

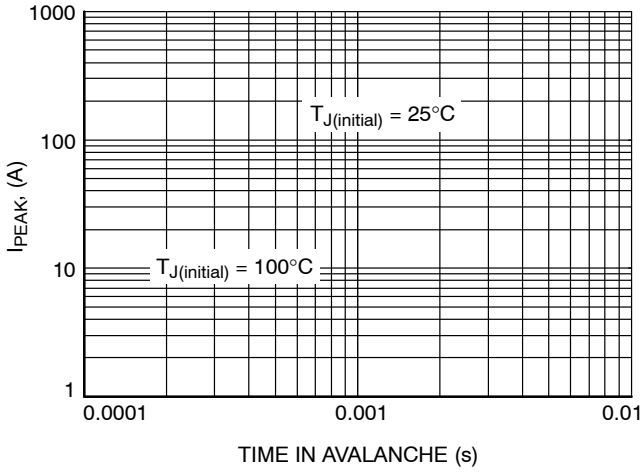


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

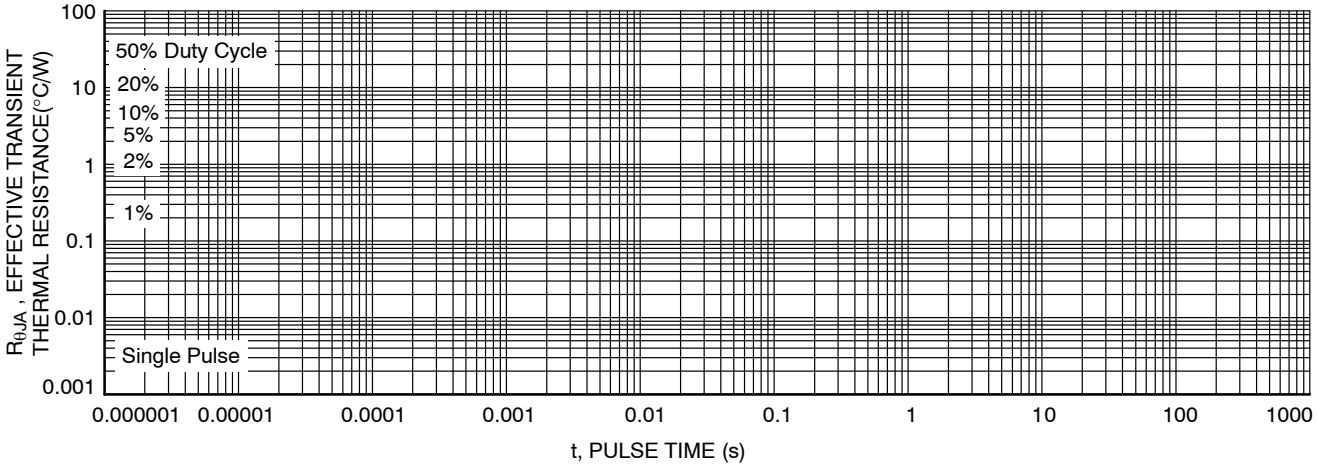
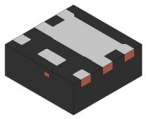


Figure 13. Thermal Characteristics



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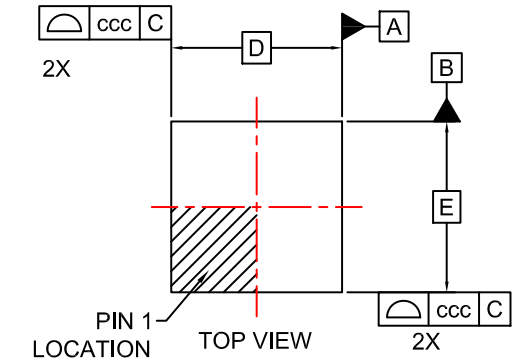
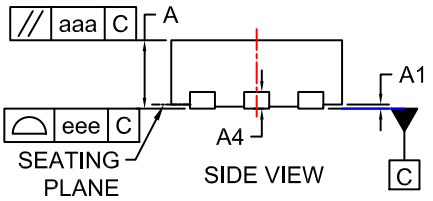
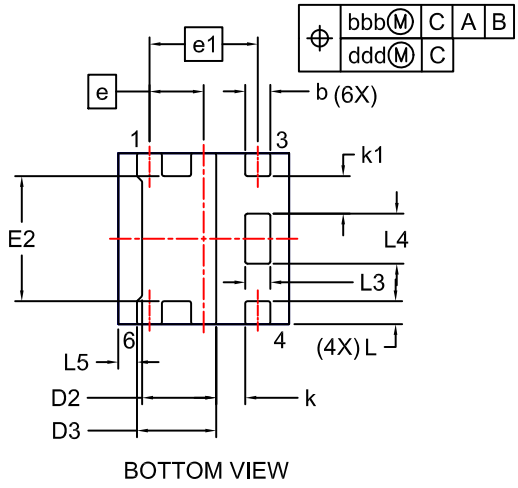
ISSUE A

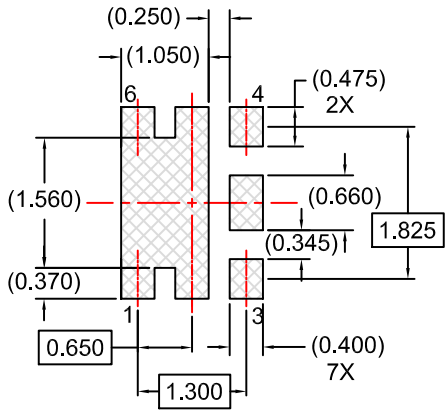
DATE 02 APR 2019







LAND PATTERN
RECOMMENDATION



NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS.
2. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. 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.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.60	0.70	0.80
A1	0.00	-	0.05
A4		(0.20)	
b	0.25	0.30	0.35
D	1.95	2.05	2.15
D2	0.84	0.89	0.94
D3		(0.95)	
E	1.95	2.05	2.15
E2	1.45	1.50	1.55
e		0.65 BSC	
e1		1.30 BSC	
k		(0.35)	
k1		(0.45)	
L	0.18	0.28	0.38
L3	0.25	0.30	0.35
L4	0.55	0.60	0.65
L5		(0.23)	
aaa		0.10	
bbb		0.10	
ccc		0.05	
ddd		0.05	
eee		0.05	

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