

# MOSFET - Power, Single

## N-Channel, WDFN6

### 30 V, 6.1 mΩ, 15.9 A

## Product Preview

## NTLJS4D9N03H

### Features

- Small Footprint (4 mm<sup>2</sup>) for Compact Design
- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Q<sub>G</sub> 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

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V <sub>DSS</sub>	30	V
Gate-to-Source Voltage			V <sub>GS</sub>	±12	V
Continuous Drain Current R <sub>θJA</sub> (Notes 1, 3)	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	15.9	A
		T <sub>A</sub> = 85°C		11.5	
Power Dissipation R <sub>θJA</sub> (Notes 1, 3)		T <sub>A</sub> = 25°C	P <sub>D</sub>	2.40	W
Continuous Drain Current R <sub>θJA</sub> (Notes 2, 3)	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	9.5	A
		T <sub>A</sub> = 85°C		6.9	
Power Dissipation R <sub>θJA</sub> (Notes 2, 3)		T <sub>A</sub> = 25°C	P <sub>D</sub>	0.86	W
Pulsed Drain Current	T <sub>A</sub> = 25°C, t <sub>p</sub> = 10 μs		I <sub>DM</sub>	64	A
Operating Junction and Storage Temperature Range			T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T <sub>L</sub>	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 <sub>θJA</sub>	52	°C/W
Junction-to-Ambient – Steady State (Note 2)	R <sub>θJA</sub>	145	

1. Surface-mounted on FR4 board using 1 in<sup>2</sup> 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<sub>θCA</sub> is determined by the user's board design.

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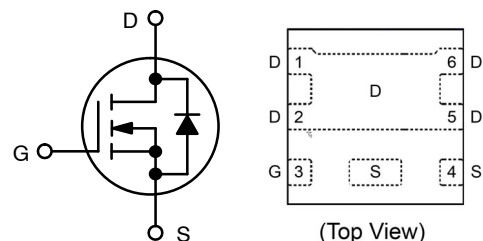


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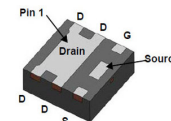
[www.onsemi.com](http://www.onsemi.com)

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> MAX	I <sub>D</sub> MAX
30 V	6.1 mΩ @ 4.5 V	15.9 A

### ELECTRICAL CONNECTION



N-CHANNEL MOSFET



### MARKING DIAGRAM

YWZZ  
A4D9

WDFN6 (2.05x2.05)  
CASE 483AV

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.

# NTLJS4D9N03H

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C		20		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 24 V	T <sub>J</sub> = 25°C		1	μA
			T <sub>J</sub> = 125°C		10	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V			±100	nA

### ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	1.2		2.1	V
Threshold Temperature Coefficient	V <sub>GS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C		-4.9		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		4.7	6.1	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 10 A		51		S
Gate Resistance	R <sub>G</sub>	T <sub>A</sub> = 25°C		1		Ω

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15 V, f = 1.0 MHz		1020		pF
Output Capacitance	C <sub>oss</sub>			415		
Reverse Transfer Capacitance	C <sub>rss</sub>			20		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A		6.8		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			1.4		
Gate-to-Source Charge	Q <sub>GS</sub>			2.5		
Gate-to-Drain Charge	Q <sub>GD</sub>			1.5		

### SWITCHING CHARACTERISTICS, V<sub>GS</sub> = 4.5 V (Note 5)

Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DD</sub> = 15 V, I <sub>D</sub> = 10 A, R <sub>G</sub> = 6 Ω		11		ns
Rise Time	t <sub>r</sub>			5.5		
Turn-Off Delay Time	t <sub>d(off)</sub>			17		
Fall Time	t <sub>f</sub>			5.7		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 10 A	T <sub>J</sub> = 25°C		0.79	1.2	V
			T <sub>J</sub> = 125°C		0.66		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = 10 A			28		ns
Reverse Recovery Charge	Q <sub>RR</sub>				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

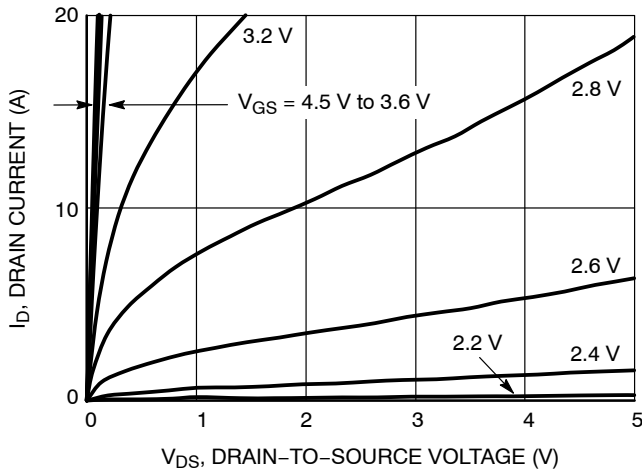


Figure 1. On-Region Characteristics

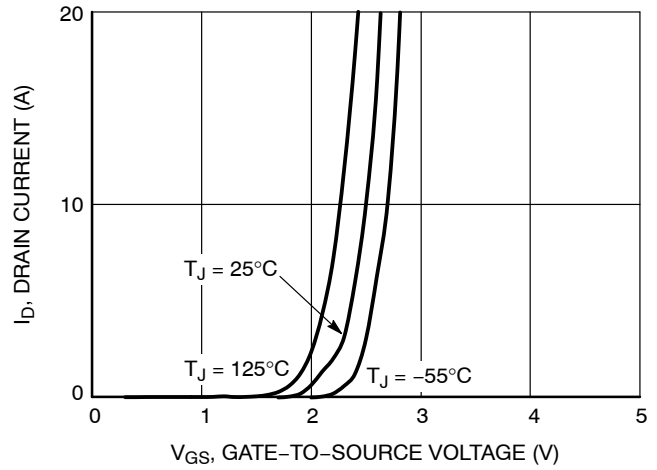


Figure 2. Transfer Characteristics

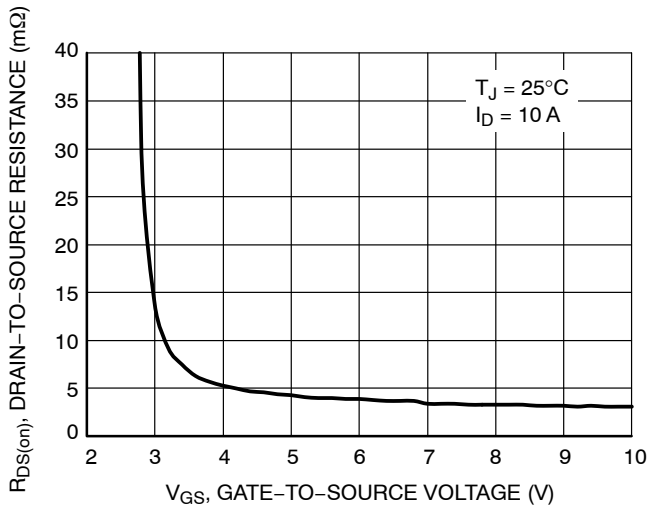


Figure 3. On-Resistance vs. Gate-to-Source Voltage

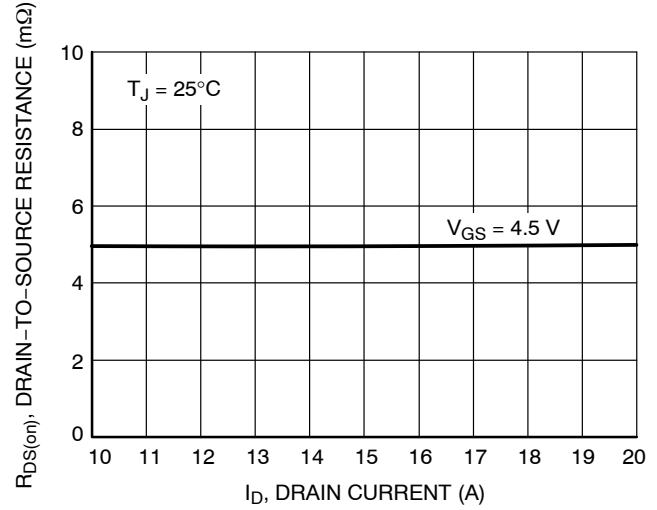


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

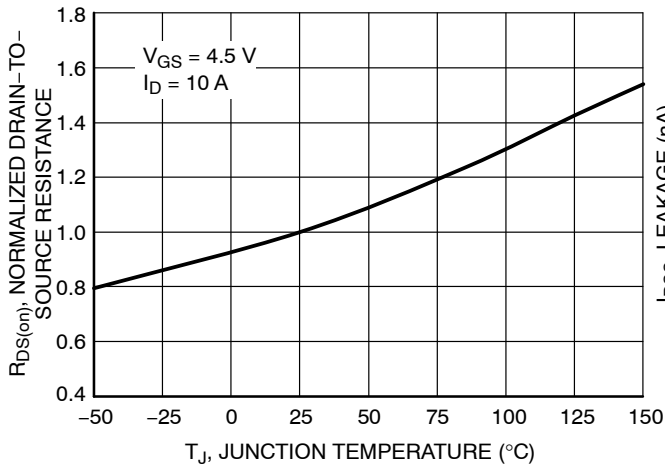


Figure 5. On-Resistance Variation with Temperature

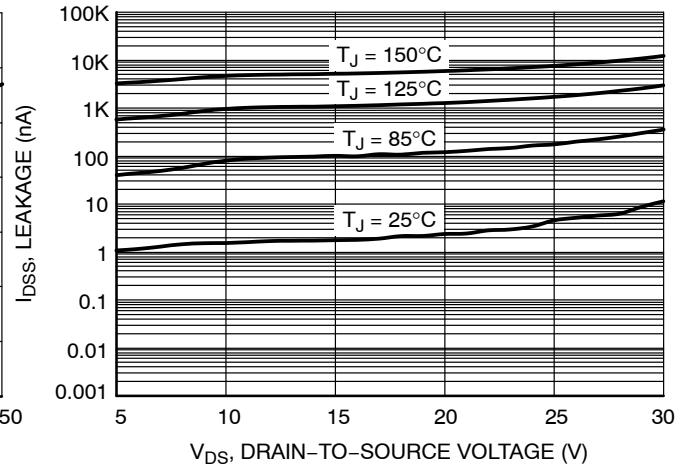


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

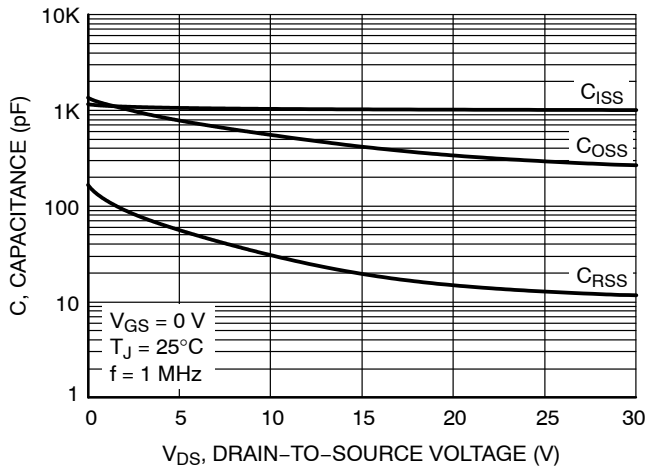


Figure 7. Capacitance Variation

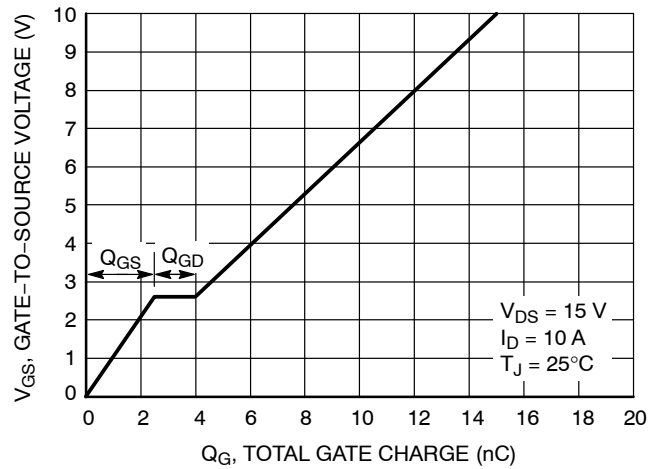


Figure 8. Gate-to-Source Voltage vs. Total Charge

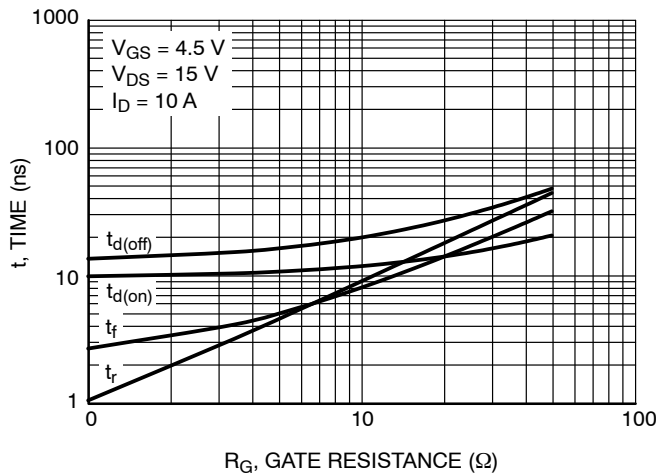


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

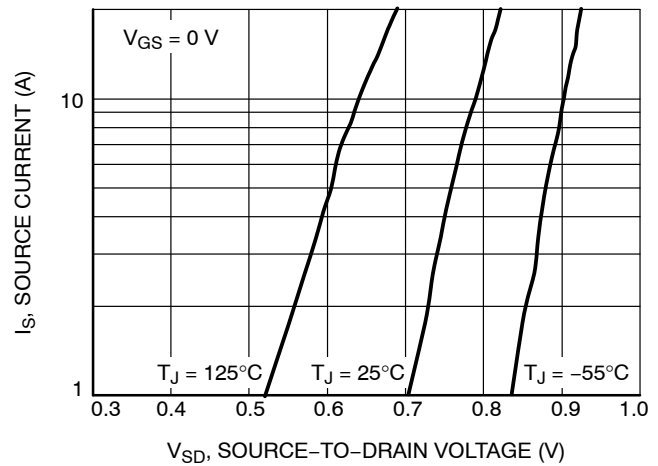


Figure 10. Diode Forward Voltage vs. Current

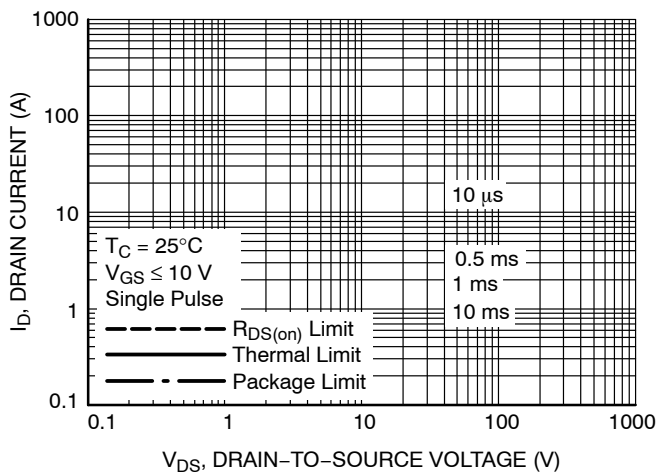


Figure 11. Maximum Rated Forward Biased Safe Operating Area

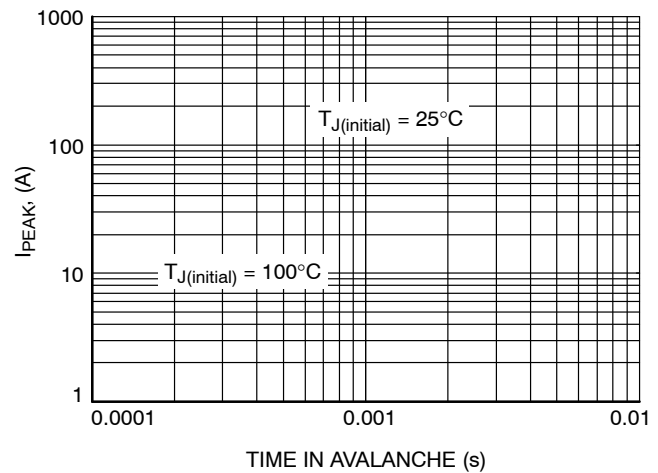


Figure 12. Maximum Drain Current vs. Time in Avalanche

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## TYPICAL CHARACTERISTICS

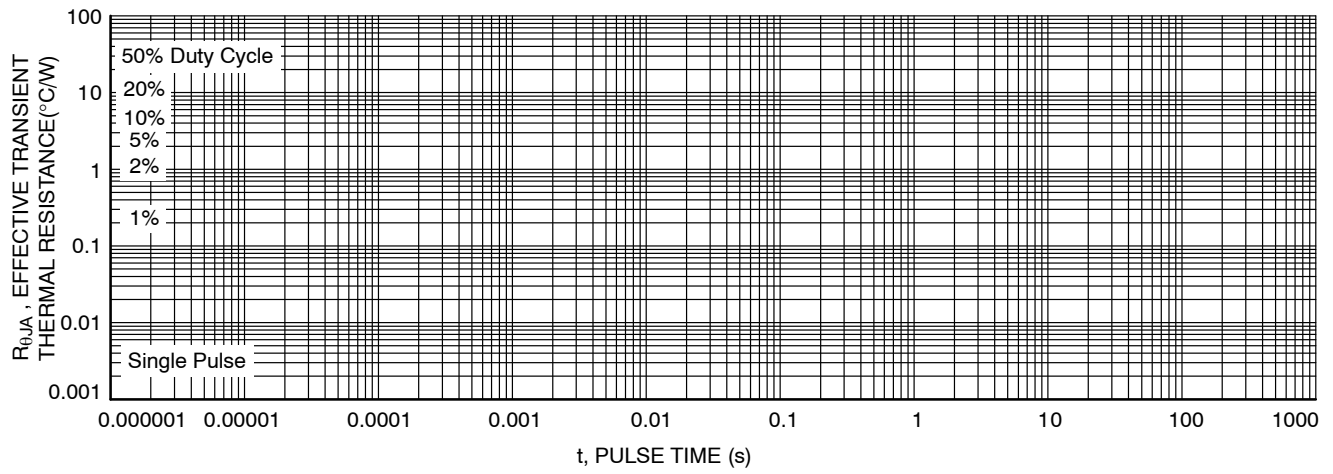
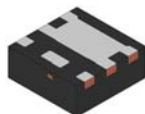
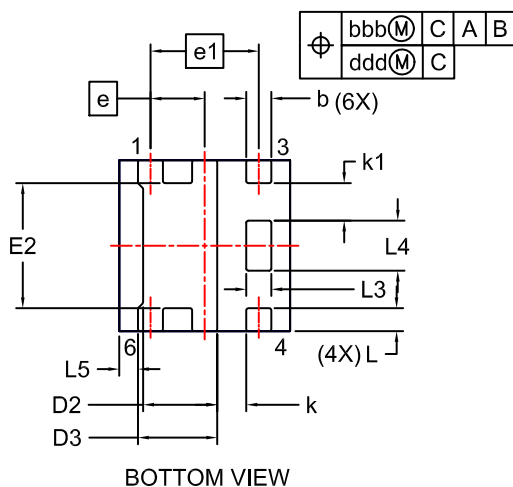
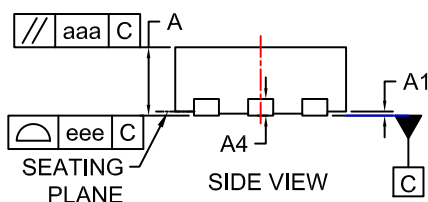
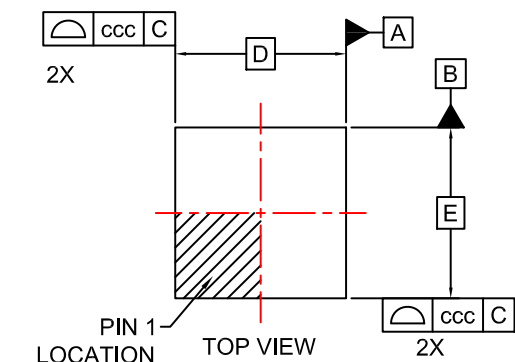


Figure 13. Thermal Characteristics

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DATE 02 APR 2019



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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