

# NTLJS3A18PZ

## Power MOSFET

–20 V, –8.2 A, Single P–Channel,  
2.0x2.0x0.8 mm WDFN Package

### Features

- WDFN Package with Exposed Drain Pads for Excellent Thermal Conduction
- Low Profile WDFN (2.0x2.0x0.8 mm) for Board Space Saving
- Ultra Low  $R_{DS(on)}$
- ESD Diode–Protected Gate
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Optimized for Power Management Applications for Portable Products, such as Smart Phones, Media Tablets, PMP, DSC, GPS, and Others
- Battery Switch
- High Side Load Switch

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Unit	
Drain–to–Source Voltage		$V_{DSS}$	–20	V	
Gate–to–Source Voltage		$V_{GS}$	$\pm 8.0$	V	
Continuous Drain Current (Note 1)	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	–8.2	A
			$T_A = 85^\circ\text{C}$	–5.9	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	–11.2		
Power Dissipation (Note 1)	Steady State	$P_D$	$T_A = 25^\circ\text{C}$	1.8	W
			$t \leq 5 \text{ s}$	3.4	
Continuous Drain Current (Note 2)	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	–5.0	A
			$T_A = 85^\circ\text{C}$	–3.6	
Power Dissipation (Note 2)	Steady State	$P_D$	$T_A = 25^\circ\text{C}$	0.7	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	–40	A	
Operating Junction and Storage Temperature		$T_J, T_{STG}$	–55 to 150	$^\circ\text{C}$	
ESD (HBM, JESD22–A114)		$V_{ESD}$	2000	V	
Source Current (Body Diode) (Note 2)		$I_S$	–1.1	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

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.

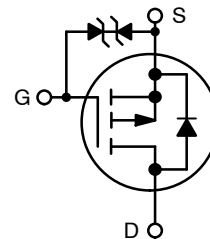
1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
2. Surface Mounted on FR4 Board using the minimum recommended pad size, (30 mm<sup>2</sup>, 2 oz Cu).



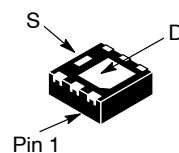
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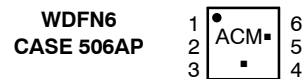
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	$I_D$ MAX
–20 V	18 m $\Omega$ @ –4.5 V	–8.2 A
	25 m $\Omega$ @ –2.5 V	
	50 m $\Omega$ @ –1.8 V	
	90 m $\Omega$ @ –1.5 V	



P–CHANNEL MOSFET

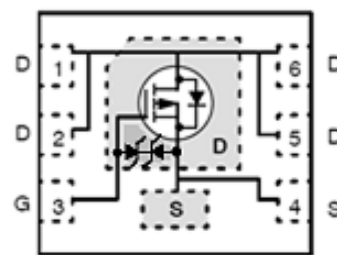


### MARKING DIAGRAM



AC = Specific Device Code  
M = Date Code  
▪ = Pb–Free Package  
(Note: Microdot may be in either location)

### PIN CONNECTIONS



(Top View)

### ORDERING INFORMATION

Device	Package	Shipping†
NTLJS3A18PZTWG	WDFN6	10000/Tape & Reel
NTLJS3A18PZTXG	(Pb–Free)	

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	69	°C/W
Junction-to-Ambient – $t \leq 5$ s (Note 1)	$R_{\theta JA}$	37	
Junction-to-Ambient – Steady State Min Pad (Note 2)	$R_{\theta JA}$	186	

## MOSFET ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0$ V, $I_D = -250$ $\mu\text{A}$	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250$ $\mu\text{A}$ , Ref to $25^\circ\text{C}$		11.5		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16$ V, $V_{GS} = 0$ V, $T_J = 25^\circ\text{C}$			-1.0	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 5.0$ V			$\pm 5.0$	$\mu\text{A}$

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$ , $I_D = -250$ $\mu\text{A}$	-0.4		-1.0	V
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.9		mV/°C
Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -7.0$ A		14.6	18	m $\Omega$
		$V_{GS} = -2.5$ V, $I_D = -5.0$ A		20	25	
		$V_{GS} = -1.8$ V, $I_D = -3.0$ A		25	50	
		$V_{GS} = -1.5$ V, $I_D = -1.0$ A		40	90	
Forward Transconductance	$g_{FS}$	$V_{DS} = -15$ V, $I_D = -3.0$ A		40		S

## CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$V_{GS} = 0$ V, $f = 1.0$ MHz, $V_{DS} = -15$ V		2240		pF
Output Capacitance	$C_{OSS}$			240		
Reverse Transfer Capacitance	$C_{RSS}$			210		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5$ V, $V_{DS} = -15$ V, $I_D = -4.0$ A		28		nC
Threshold Gate Charge	$Q_{G(TH)}$			1.0		
Gate-to-Source Charge	$Q_{GS}$			2.9		
Gate-to-Drain Charge	$Q_{GD}$			8.8		

## SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5$ V, $V_{DD} = -15$ V, $I_D = -4.0$ A, $R_G = 1.0$ $\Omega$		8.6		ns
Rise Time	$t_r$			15		
Turn-Off Delay Time	$t_{d(OFF)}$			150		
Fall Time	$t_f$			88		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Recovery Voltage	$V_{SD}$	$V_{GS} = 0$ V, $I_S = -1.0$ A	$T_J = 25^\circ\text{C}$	-0.63	-1.0	V
			$T_J = 125^\circ\text{C}$	-0.50		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0$ V, $d_{ISD}/d_t = 100$ A/ $\mu\text{s}$ , $I_S = -1.0$ A		26.1		ns
Charge Time	$t_a$			10.2		
Discharge Time	$t_b$			15.9		
Reverse Recovery Time	$Q_{RR}$			12		

- Pulse Test: Pulse Width  $\leq 300$   $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- Switching characteristics are independent of operating junction temperatures.

# NTLJS3A18PZ

## TYPICAL CHARACTERISTICS

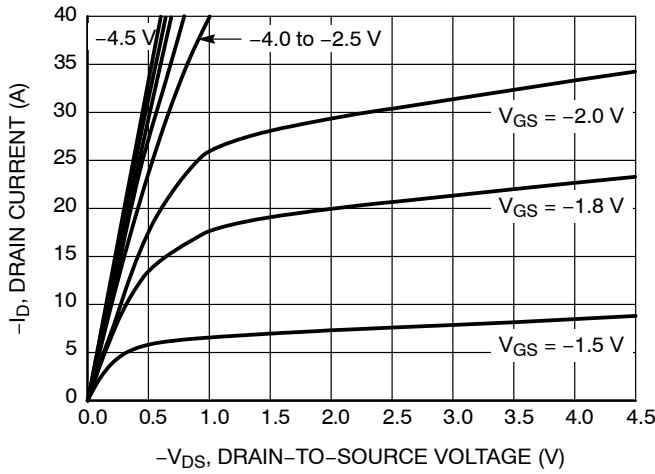


Figure 1. On-Region Characteristics

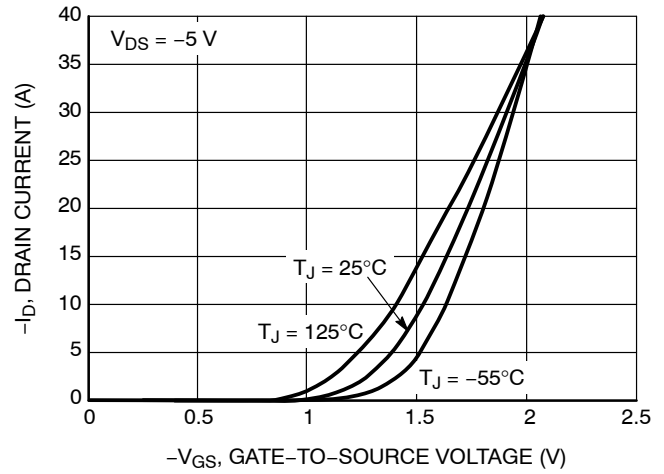


Figure 2. Transfer Characteristics

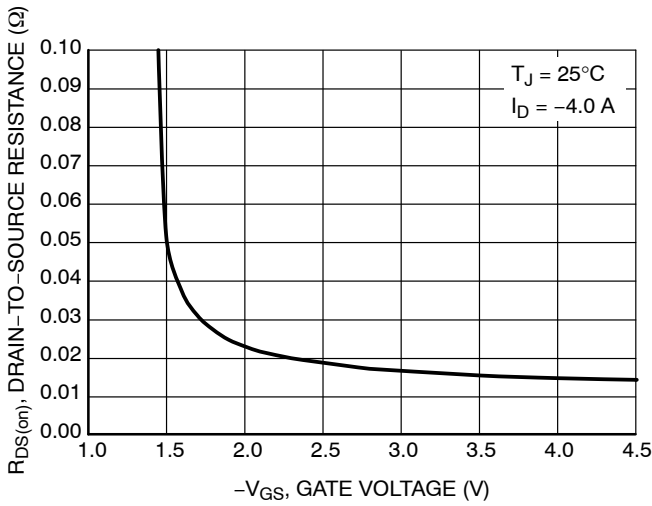


Figure 3. On-Resistance vs. Gate-to-Source Voltage

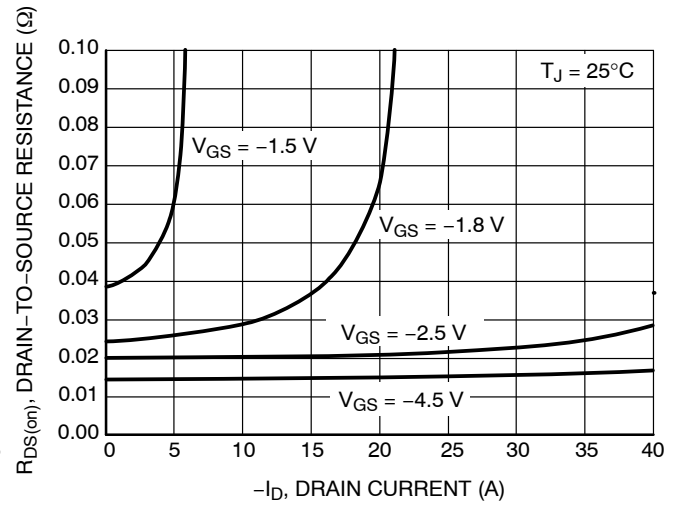


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

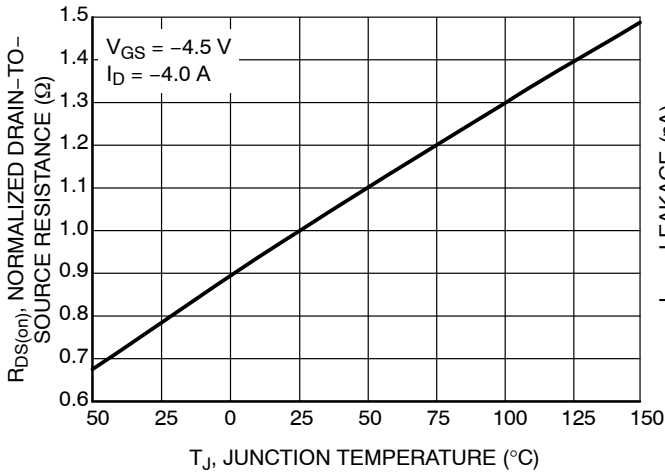


Figure 5. On-Resistance Variation with Temperature

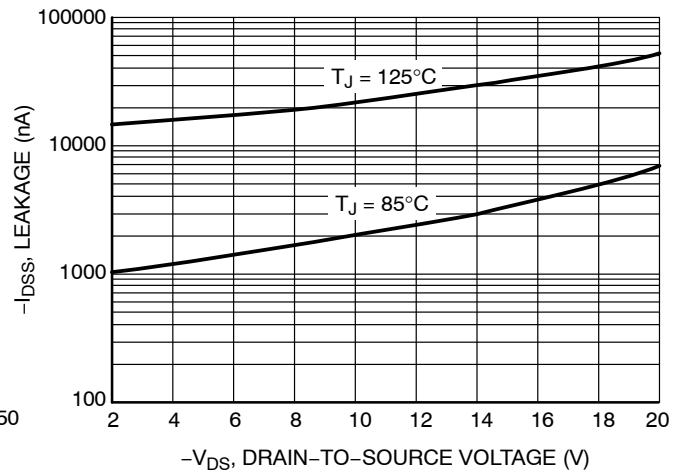


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

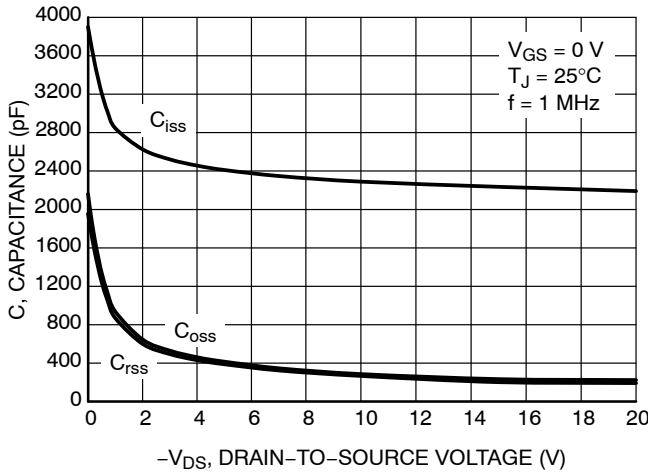


Figure 7. Capacitance Variation

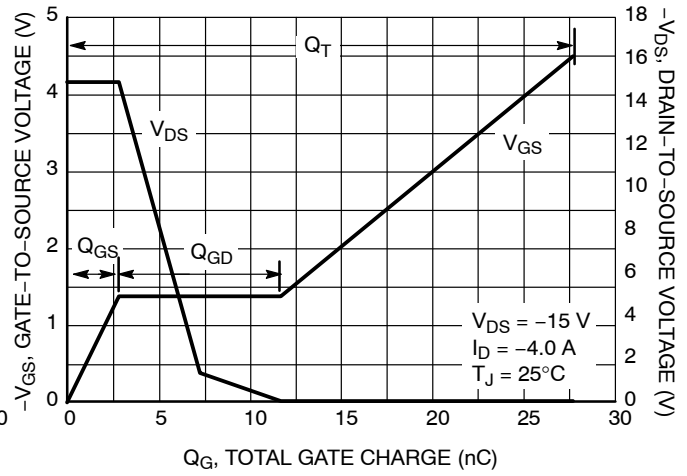


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

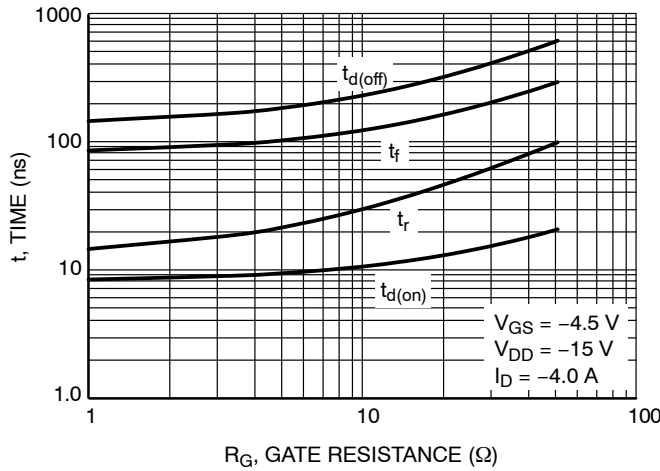


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

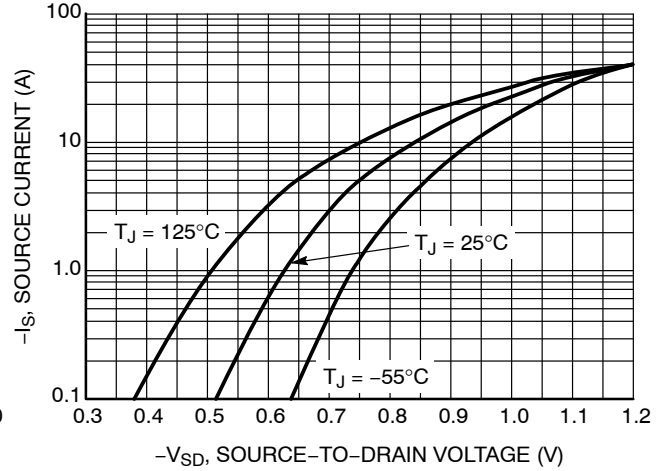


Figure 10. Diode Forward Voltage vs. Current

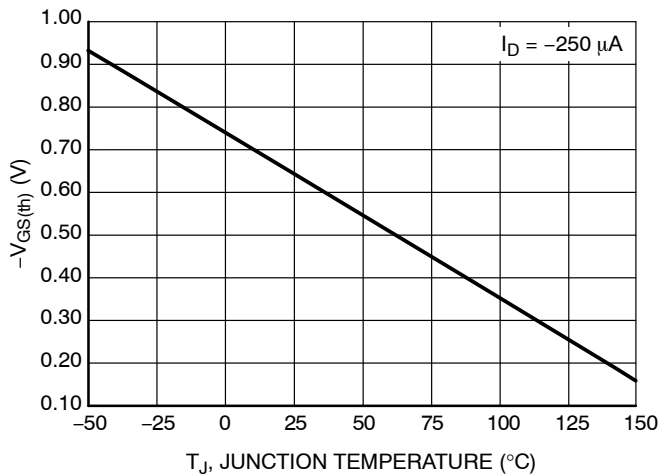


Figure 11. Threshold Voltage

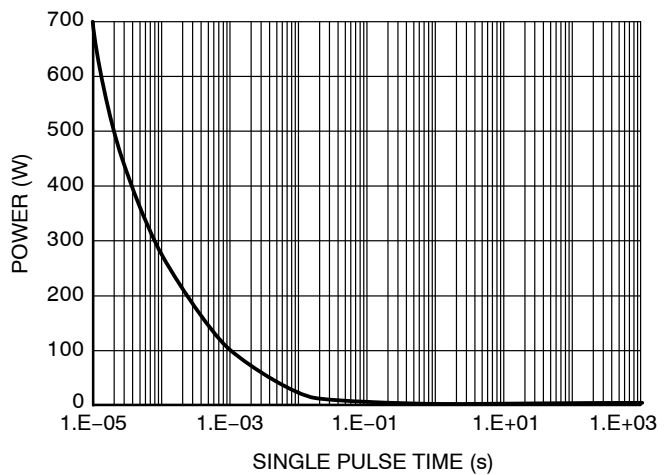
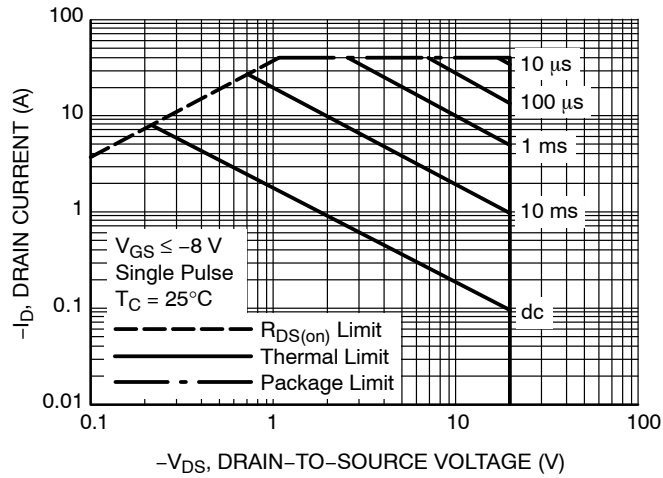


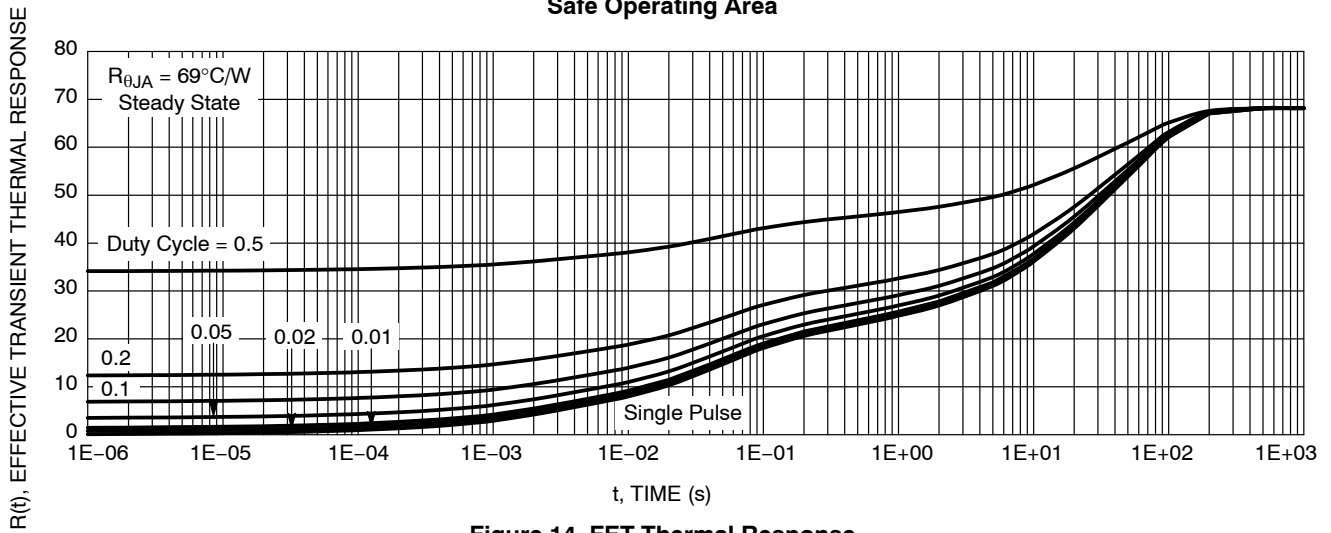
Figure 12. Single Pulse Maximum Power Dissipation

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## TYPICAL CHARACTERISTICS



**Figure 13. Maximum Rated Forward Biased Safe Operating Area**



**Figure 14. FET Thermal Response**

# MECHANICAL CASE OUTLINE

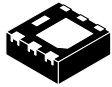
## PACKAGE DIMENSIONS

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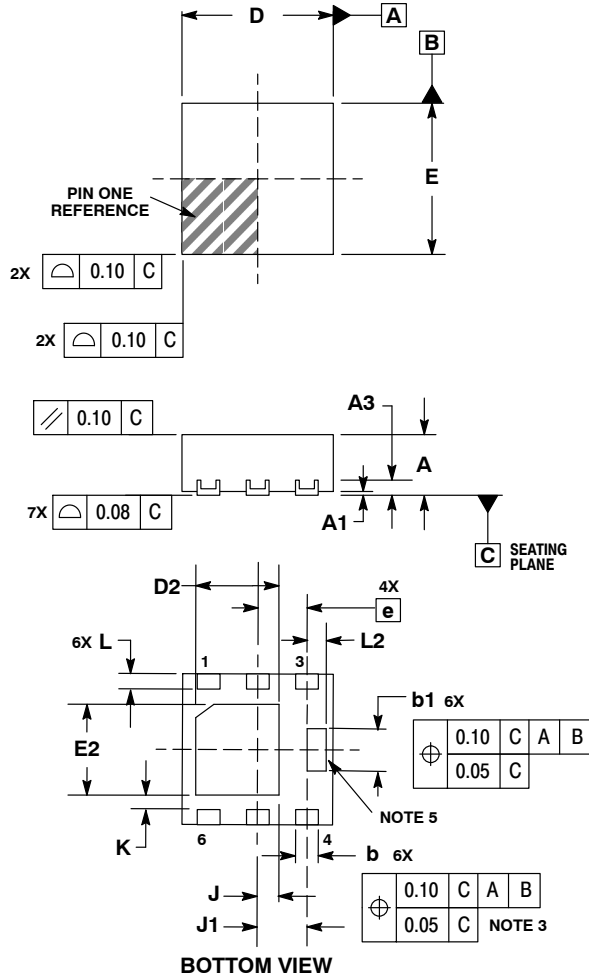


### WDFN6 2x2 CASE 506AP-01 ISSUE B

DATE 26 APR 2006



SCALE 4:1



STYLE 1:  
PIN 1. DRAIN  
2. DRAIN  
3. GATE  
4. SOURCE  
5. DRAIN  
6. DRAIN

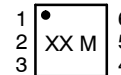
STYLE 2:  
PIN 1. COLLECTOR  
2. COLLECTOR  
3. BASE  
4. EMITTER  
5. COLLECTOR  
6. COLLECTOR

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
1. CENTER TERMINAL LEAD IS OPTIONAL. TERMINAL LEAD IS CONNECTED TO TERMINAL LEAD # 4.
2. PINS 1, 2, 5 AND 6 ARE TIED TO THE FLAG.

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
b1	0.51	0.61
D	2.00 BSC	
D2	1.00	1.20
E	2.00 BSC	
E2	1.10	1.30
e	0.65 BSC	
K	0.15 REF	
L	0.20	0.30
L2	0.20	0.30
J	0.27 REF	
J1	0.65 REF	

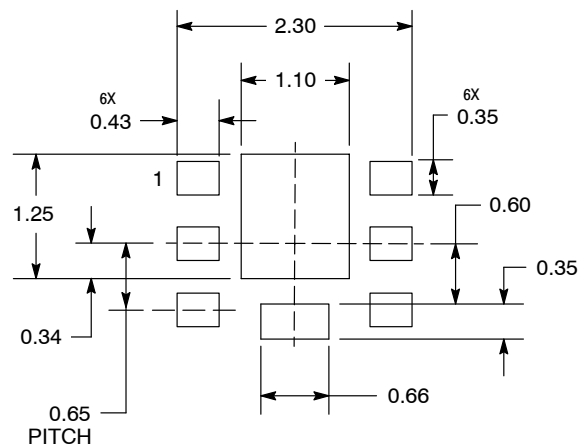
### GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present.

### SOLDERMASK DEFINED MOUNTING FOOTPRINT



DIMENSIONS: MILLIMETERS

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<b>DESCRIPTION:</b>	<b>6 PIN WDFN 2X2, 0.65P</b>	<b>PAGE 1 OF 1</b>

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