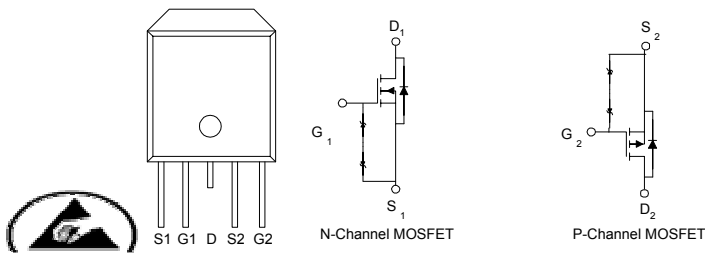


### P & N-Channel 30-V (D-S) MOSFET

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $r_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe DPAK saves board space
- Fast switching speed
- High performance trench technology

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ m( $\Omega$ )	$I_D$ (A)
30	45 @ $V_{GS} = 4.5V$	29
	35 @ $V_{GS} = 10V$	36
-30	70 @ $V_{GS} = -4.5V$	-20
	52 @ $V_{GS} = -10V$	-26



ESD Protected  
2000V

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)					
Parameter		Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage		$V_{DS}$	30	-30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_A = 25^\circ C$	$I_D$	36	-26	A
	$T_A = 70^\circ C$		30	-21	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	40	-40	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	30	-30	A
Power Dissipation <sup>a</sup>	$T_A = 25^\circ C$	$P_D$	50	50	W
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175		$^\circ C$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>a</sup>	$R_{\theta JA}$	50	$^\circ C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	3.0	$^\circ C/W$

Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Conditions	Limits				Unit
			Ch	Min	Typ	Max	
<b>Static</b>							
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 uA	N	0.6			V
		V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 uA	P	-0.6			
Gate-Body Leakage	I <sub>CSS</sub>	V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V	P			±100	nA
		V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V	N			±100	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V	P			-1	uA
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V	N			1	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	N	20			A
		V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -10 V	P	-20			
Drain-Source On-Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.9 A	N			35	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6 A				45	
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.2 A	P			52	
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4.2 A				70	
Forward Transconductance <sup>a</sup>	g <sub>s</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 6.9 A	N		25		S
		V <sub>DS</sub> = -15 V, I <sub>D</sub> = -5.2 A	P		10		
<b>Dynamic</b>							
Total Gate Charge	Q <sub>g</sub>	N-Channel V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.9A P-Channel V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.2A	N		6.0		nC
			P		10		
Gate-Source Charge	Q <sub>gs</sub>		N		1.0		
			P		2.4		
Gate-Drain Charge	Q <sub>gd</sub>		N		1.5		
			P		3.9		
Turn-On Delay Time	t <sub>d(on)</sub>	N-Chaneel V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =1A , R <sub>GEN</sub> =6Ω P-Channel V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-1A R <sub>GEN</sub> =6Ω	N		7.4		nS
			P		7.6		
Rise Time	t <sub>r</sub>		N		4		
			P		6.8		
Turn-Off Delay Time	t <sub>d(off)</sub>		N		22.2		
			P		33.6		
Fall-Time	t <sub>f</sub>		N		3.6		
			P		23.2		

Notes

- a. Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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## Typical Electrical Characteristics (N-Channel)

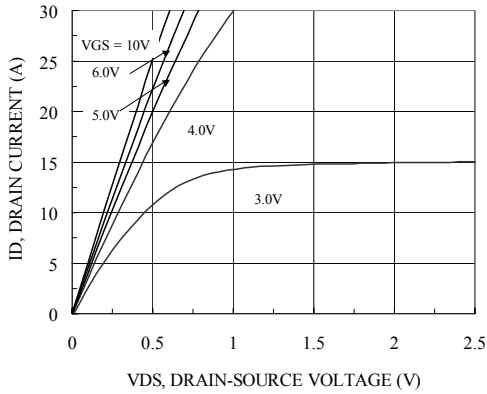


Figure 1. On-Region Characteristics

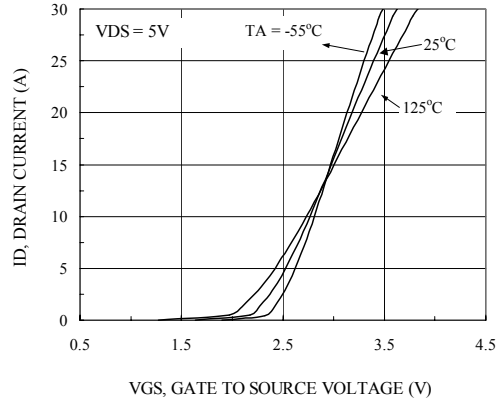


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

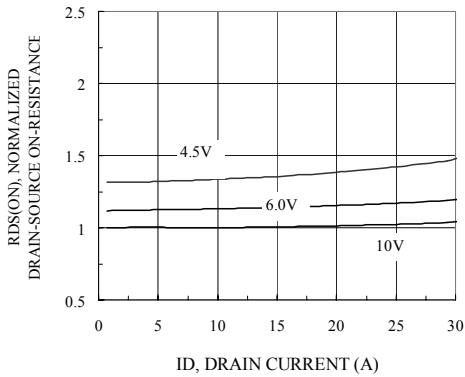


Figure 3. On Resistance Vs Vgs Voltage

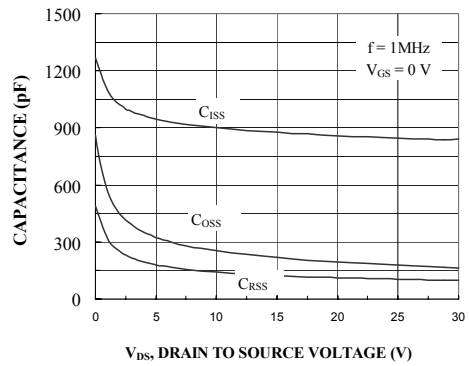


Figure 4. Capacitance Characteristics

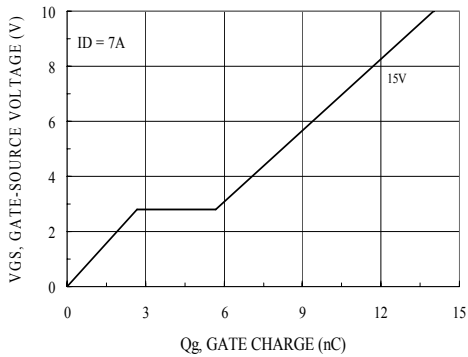


Figure 5. Gate Charge Characteristics

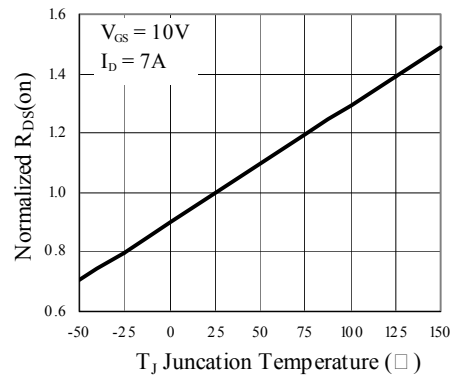


Figure 6. On-Resistance Variation with Temperature

## Typical Electrical Characteristics (N-Channel)

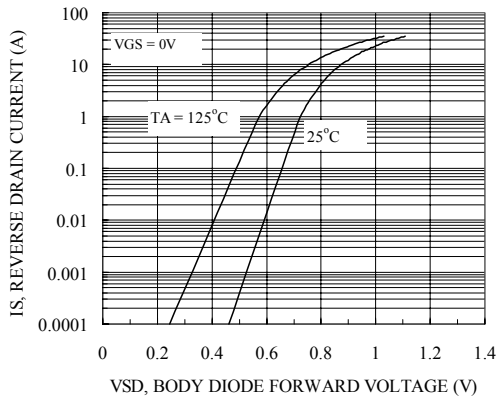


Figure 7. Transfer Characteristics

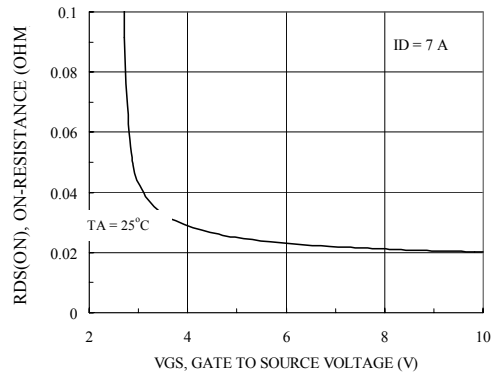


Figure 8. On-Resistance with Gate to Source Voltage

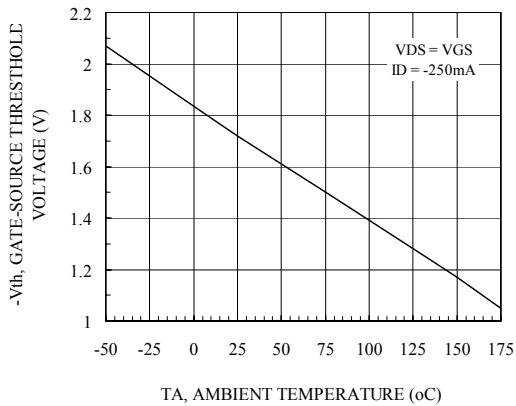


Figure 9. Vth Gate to Source Voltage Vs Temperature

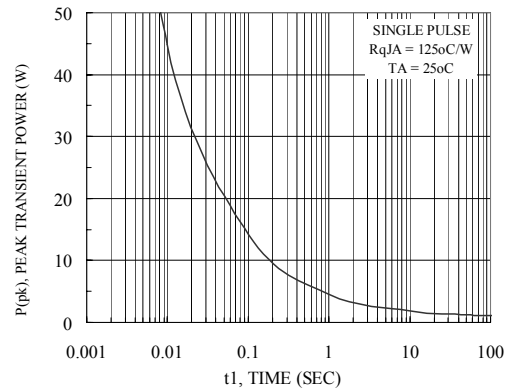


Figure 10. Single Pulse Maximum Power Dissipation

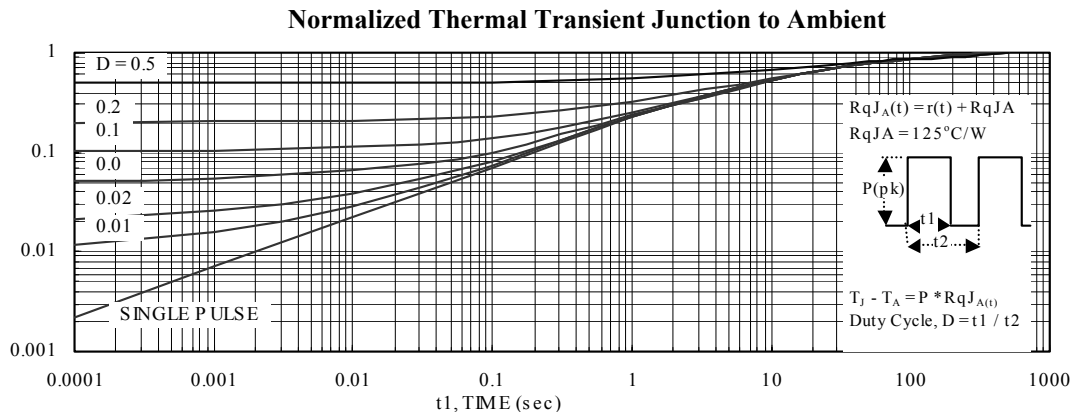


Figure 11. Transient Thermal Response Curve

## Typical Electrical Characteristics (P-Channel)

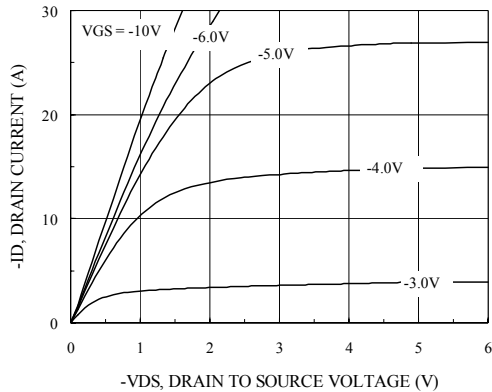


Figure 1. On-Region Characteristics

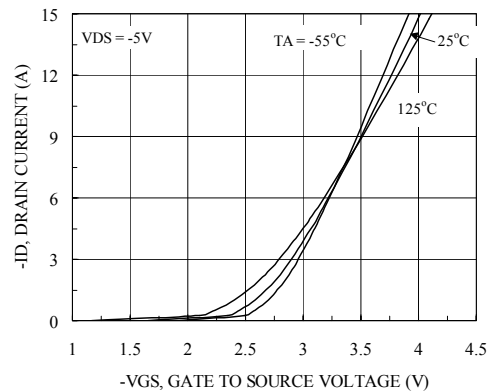


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

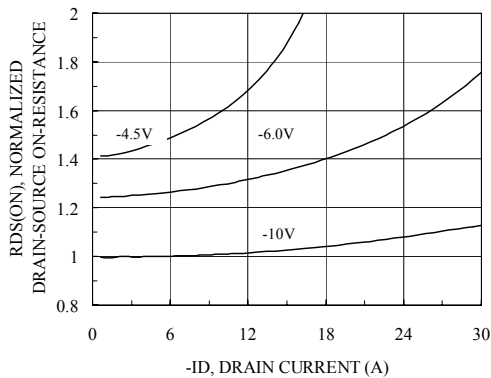


Figure 3. On Resistance Vs Vgs Voltage

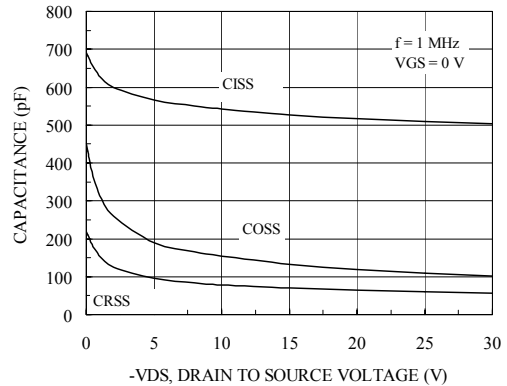


Figure 4. Capacitance Characteristics

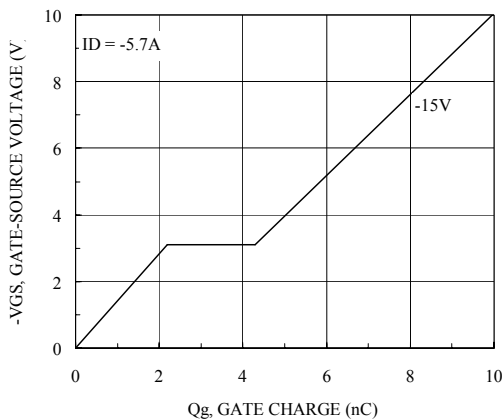


Figure 5. Gate Charge Characteristics

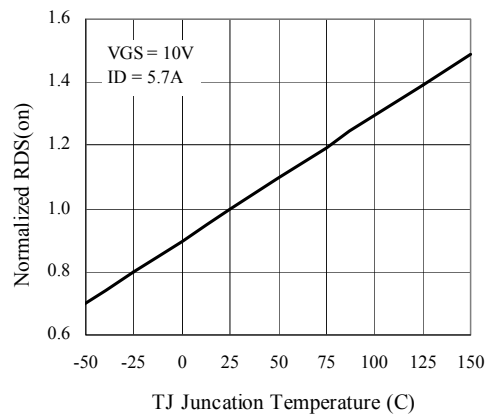


Figure 6. On-Resistance Variation with Temperature

### Typical Electrical Characteristics (P-Channel)

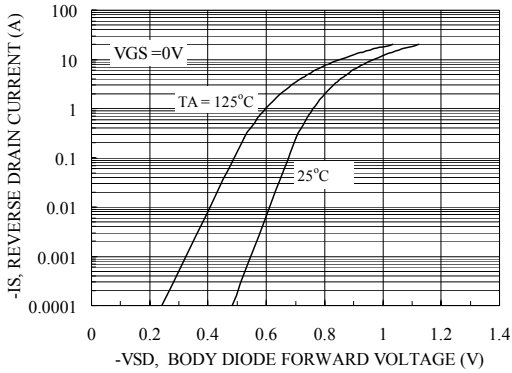


Figure 7. Transfer Characteristics

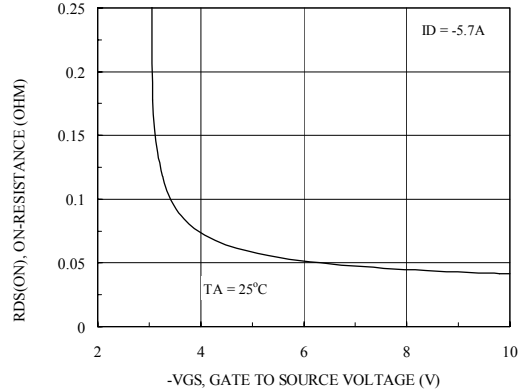


Figure 8. On-Resistance with Gate to Source Voltage

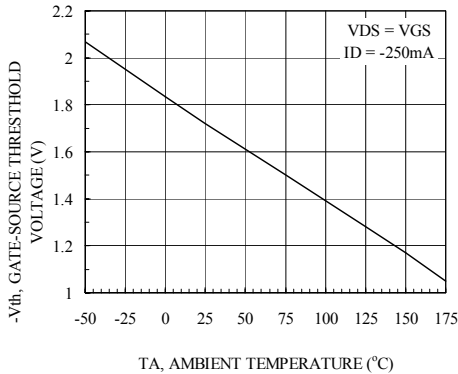


Figure 9. Vth Gate to Source Voltage Vs Temperature

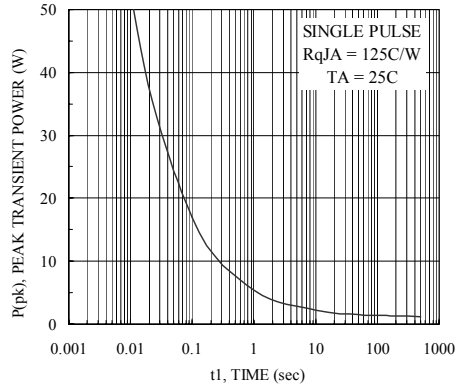


Figure 10. Single Pulse Maximum Power Dissipation

### Normalized Thermal Transient Junction to Ambient

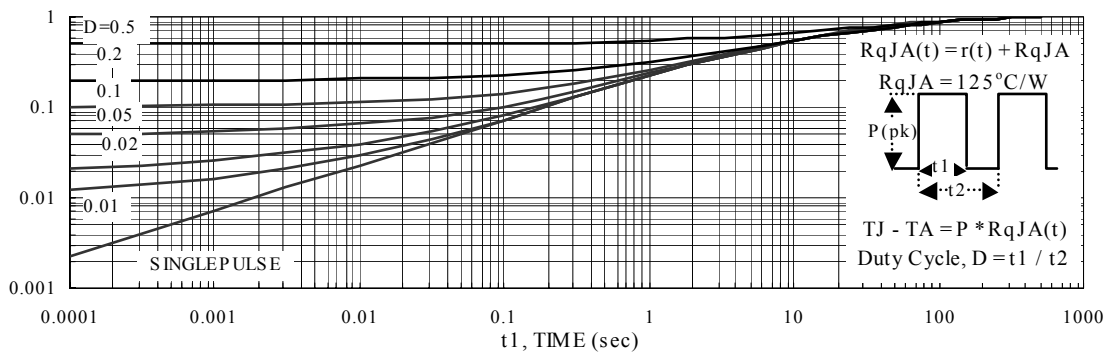
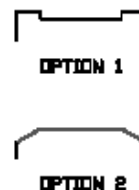
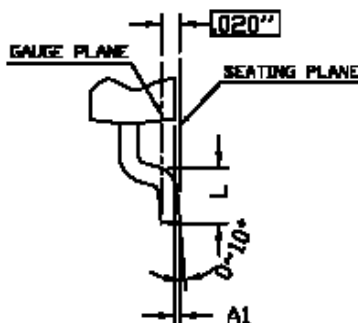
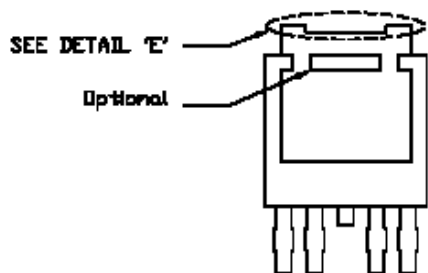
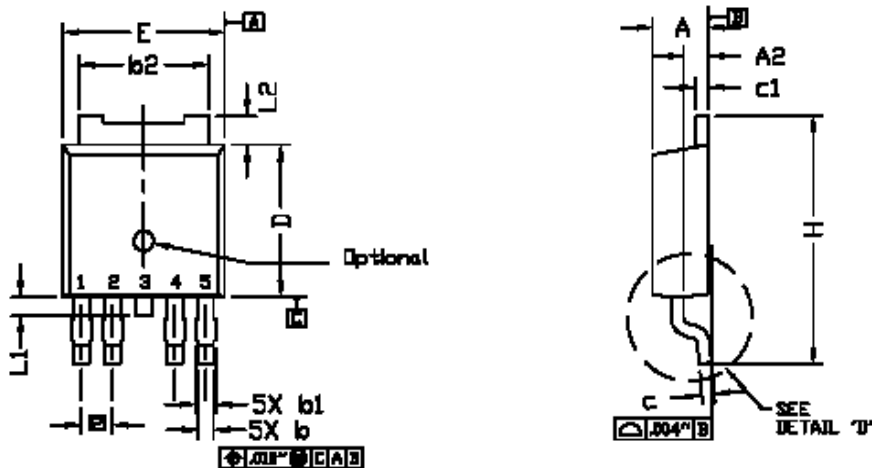


Figure 11. Transient Thermal Response Curve

TO252\_4L PACKAGE OUTLINE



DETAIL 'D'

DETAIL 'E'

SYMBOL	DIMENSION IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	2.184	2.288	2.388	0.086	0.090	0.094
A1	0.000	—	0.127	0.000	—	0.005
A2	0.889	—	1.143	0.035	—	0.045
b	0.508	—	0.711	0.020	—	0.028
b1	0.584	—	0.787	0.023	—	0.031
b2	4.953	—	5.461	0.195	—	0.215
c	0.457	0.508	0.610	0.018	0.020	0.024
c1	0.457	—	0.610	0.018	—	0.024
D	5.969	6.096	6.223	0.235	0.240	0.245
E	6.350	6.604	6.731	0.250	0.260	0.265
e	1.270 BSC.			0.050 BSC.		
H	9.398	—	10.414	0.370	—	0.410
L	1.270	—	2.032	0.050	—	0.080
L1	—	—	1.016	—	—	0.040
L2	0.889	—	1.270	0.035	—	0.050

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MIL.
2. DIMENSION L IS MEASURED IN GAUGE PLANE.
3. TOLERANCE 0.10 mm UNLESS OTHERWISE SPECIFIED.
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. REFER TO JEDEC TO-252 (AD).