



## 30V/4A P-Channel Enhancement Mode Field Effect Transistor

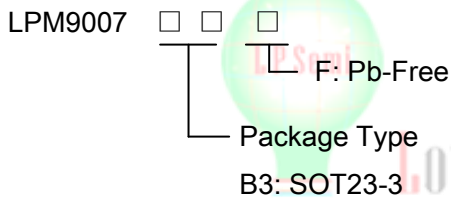
### General Description

The LPM9007 is the P-channel logic enhancement mode power field effect transistors are produced in using high cell density, DMOS trench technology.

This high density process is especially tailored to minimize on-state resistance.

These devices are particularly suited for low voltage applications, notebook computer power management and other battery powered circuits where it is high-side switching.

### Order Information



### Features

- ◆ -30V/-3.0A, RDC(ON)=52mΩ(typ.)@VGS=-4.5V
- ◆ ■ -30V/-3.0A, RDC(ON)=80mΩ(typ.)@VGS=-2.5V
- ◆ ■ Super high density cell design for extremely low RDC(ON)
- ◆ ■ SOT23 Package

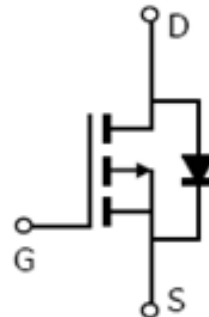
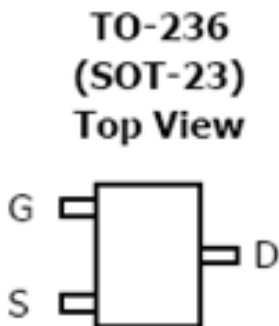
### Applications

- ◇ Portable Media Players
- ◇ Cellular and Smart mobile phone
- ◇ LCD
- ◇ DSC Sensor
- ◇ Wireless Card

### Marking Information

Device	Marking	Package	Shipping
LPM9007		SOT23-3	3K/REEL

### Pin Configurations





## Absolute Maximum Ratings

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		$V_{DS}$	-30	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current A	$T_A=25^\circ\text{C}$	$I_D$	-4.2	A
	$T_A=70^\circ\text{C}$		-3.5	
Pulsed Drain Current B		$I_{DM}$	-30	
Power Dissipation A	$T_A=25^\circ\text{C}$	$P_D$	1.4	W
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

## Thermal resistance ratings

Parameter	Symbol	Typ.	Max.	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$		125	$^\circ\text{C/W}$

## Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ.	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.7	-1	-1.3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-4.5\text{V}, V_{DS}=-5\text{V}$	-25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-4.2\text{A}$ ( $T_J=125^\circ\text{C}$ )		42	50 75	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-4\text{A}$		53	65	$\text{m}\Omega$
		$V_{GS}=-2.5\text{V}, I_D=-1\text{A}$		80	120	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-5\text{A}$	7	11		S
$V_{SD}$	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.75	-1	V



$I_s$	Maximum Body-Diode Continuous Current				-2.2	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V, f=1MHz$		954		pF
$C_{oss}$	Output Capacitance			115		pF
$C_{rss}$	Reverse Transfer Capacitance			77		pF
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$		6		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-15V, I_D=-4A$		9.4		nC
$Q_{gs}$	Gate Source Charge			2		nC
$Q_{gd}$	Gate Drain Charge			3		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10V, V_{DS}=-15V, R_L=3.6\Omega, R_{GEN}=6\Omega$		6.3		nS
$t_r$	Turn-On Rise Time			3.2		
$t_{D(off)}$	Turn-Off DelayTime			38.2		
$t_f$	Turn-Off Fall Time			12		
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=-4A, di/dt=100A/\mu s$		20.2		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-4A, di/dt=100A/\mu s$		11.2		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The value in any a given application depends on the user's specific board design. The current rating is based on the  $t \leq 10s$  thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80  $\mu s$  pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The SOA curve provides a single pulse rating.



### Typical Characteristics

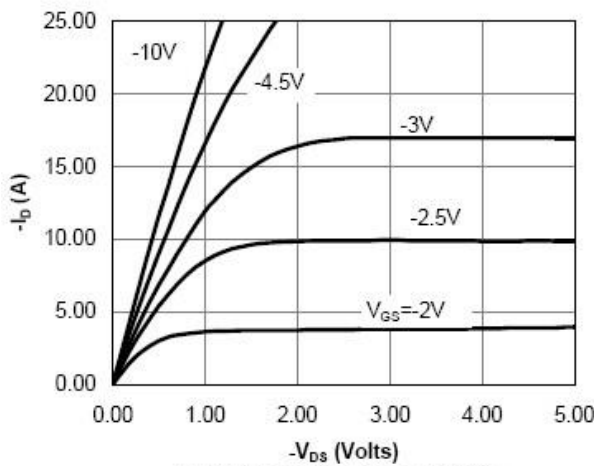


Fig 1: On-Region Characteristics

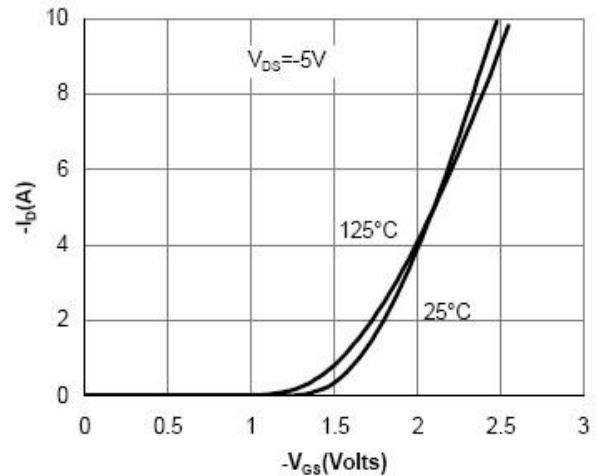


Figure 2: Transfer Characteristics

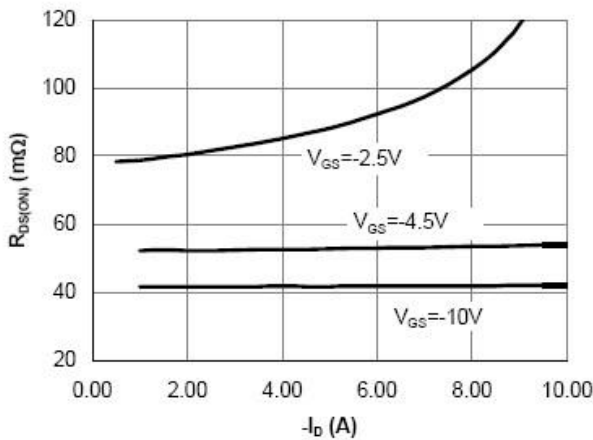


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

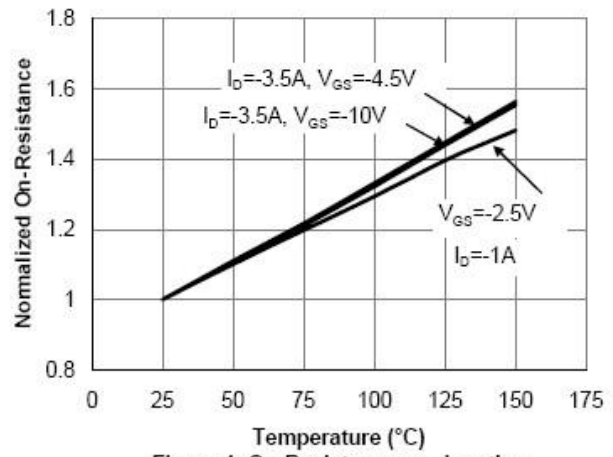


Figure 4: On-Resistance vs. Junction Temperature

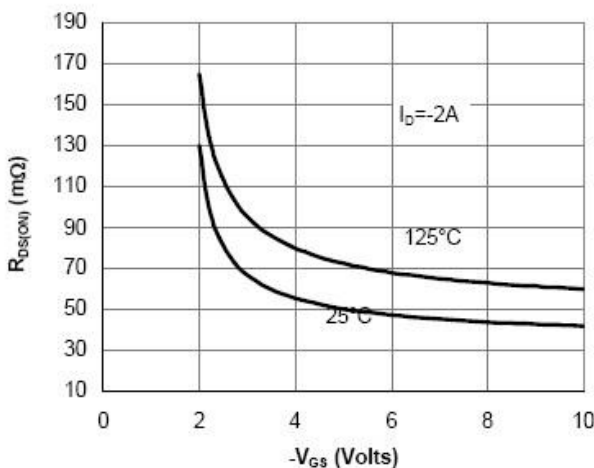


Figure 5: On-Resistance vs. Gate-Source Voltage

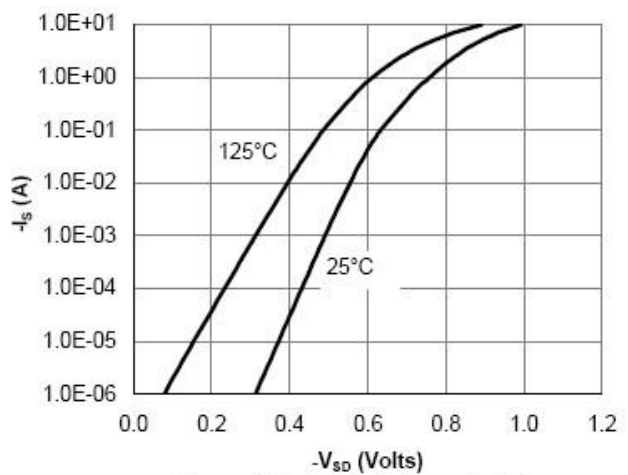


Figure 6: Body-Diode Characteristics

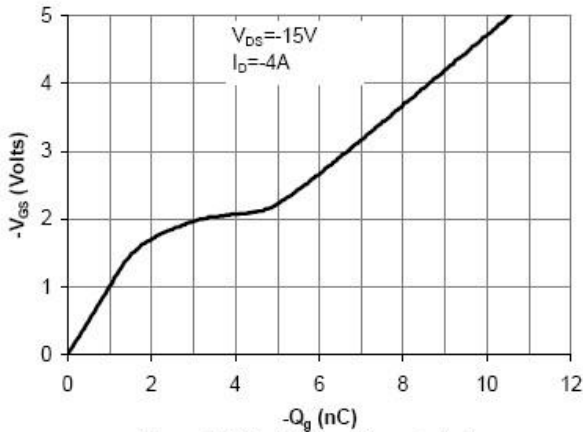


Figure 7: Gate-Charge Characteristics

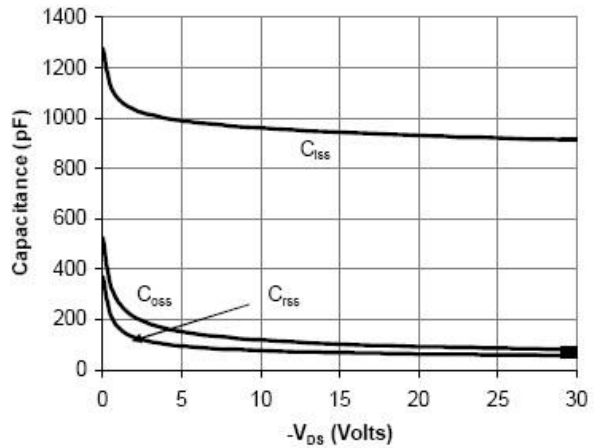


Figure 8: Capacitance Characteristics

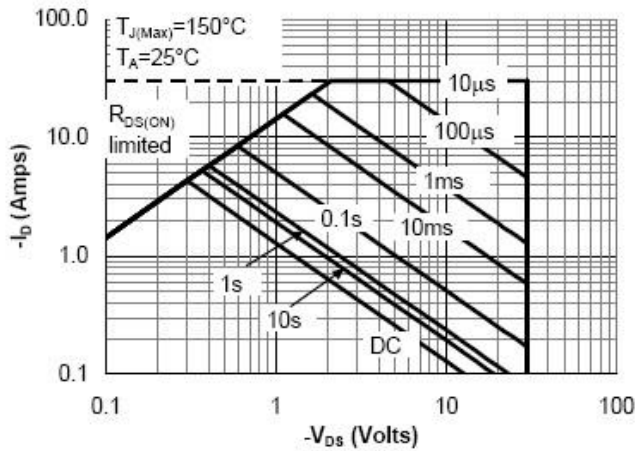


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

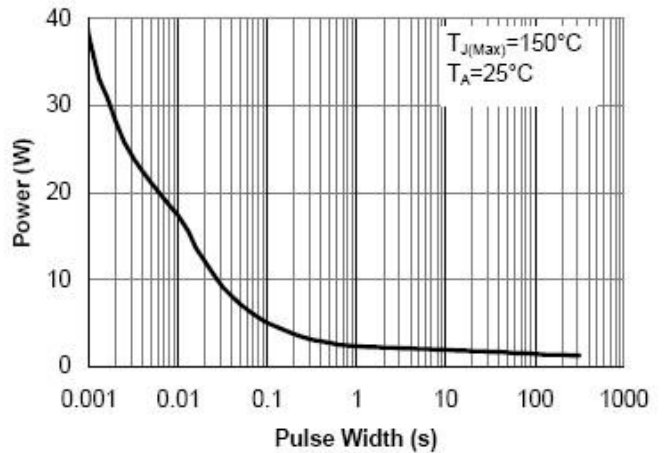


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

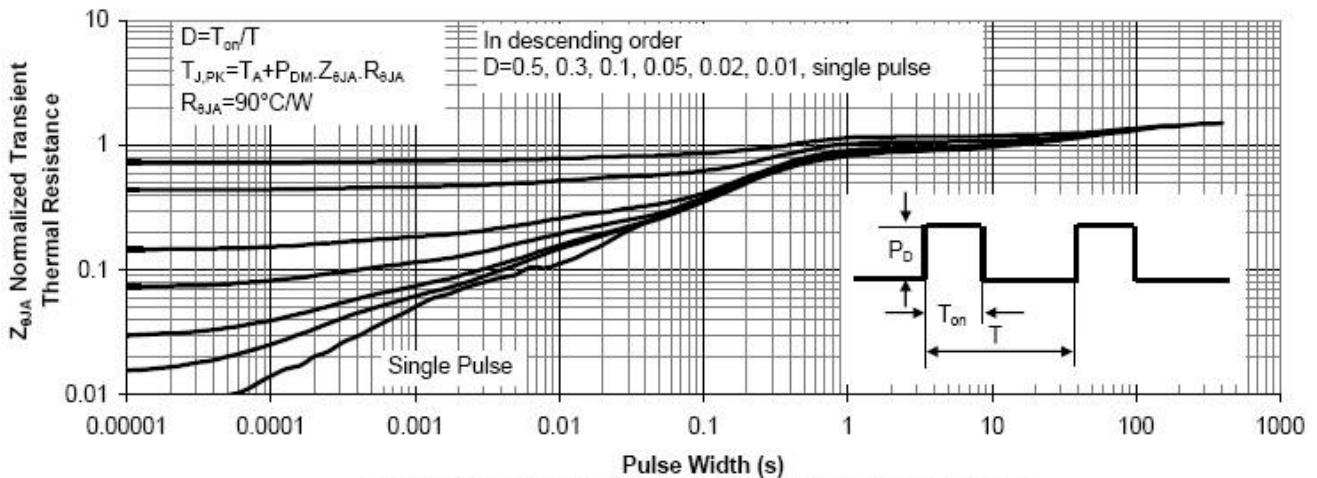
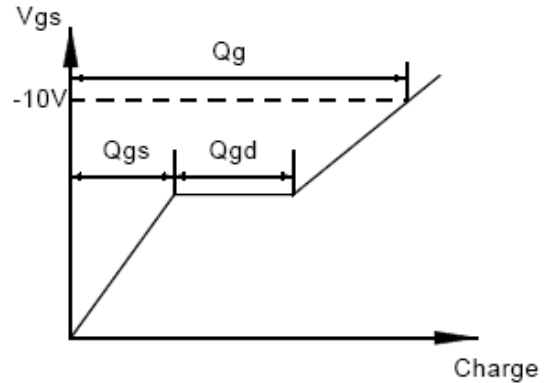
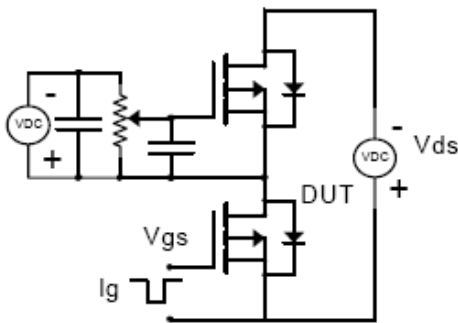


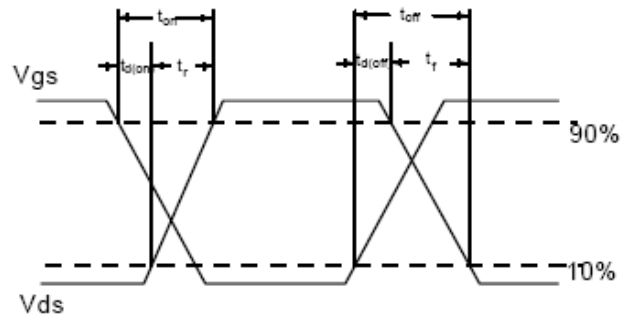
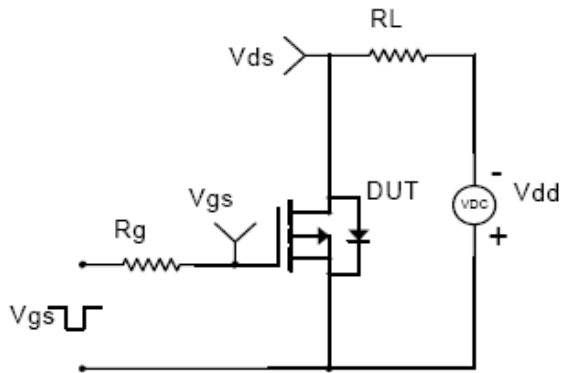
Figure 11: Normalized Maximum Transient Thermal Impedance



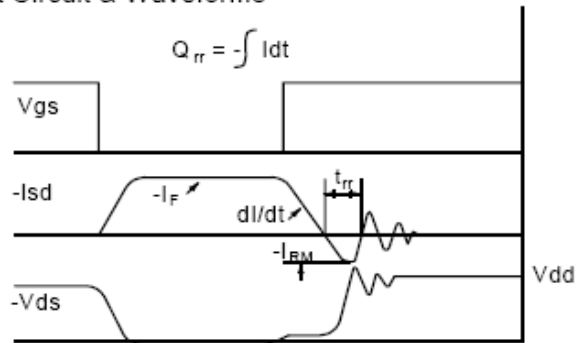
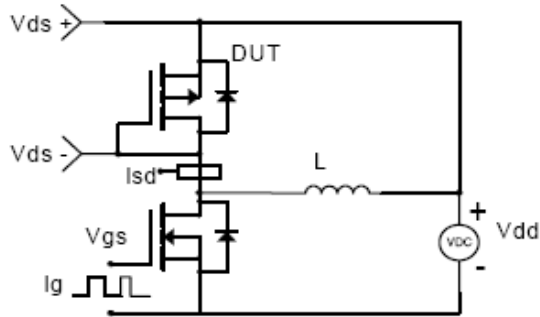
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



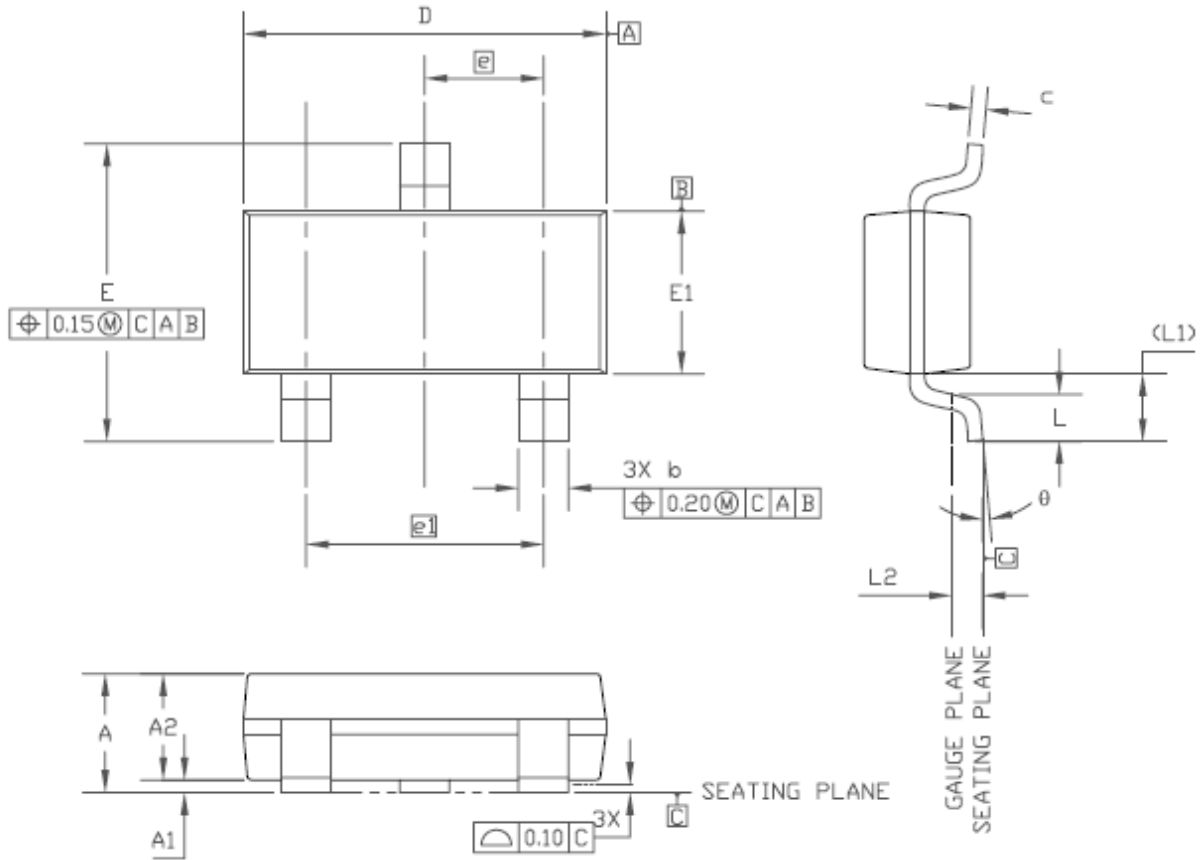
Diode Recovery Test Circuit & Waveforms



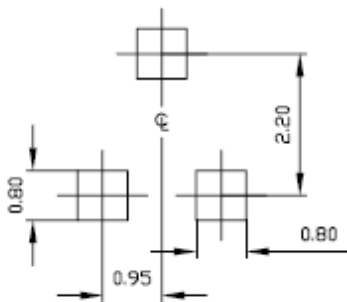


## Package Information

### SOT-23 STANDARD PACKAGE OUTLINE



#### RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.75	—	1.17	0.030	—	0.046
A1	0.05	—	0.15	0.002	—	0.006
A2	0.70	0.85	1.02	0.028	0.033	0.040
b	0.30	—	0.50	0.012	—	0.020
c	0.08	—	0.20	0.003	—	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	2.10	—	2.64	0.083	—	0.104
E1	1.20	1.30	1.40	0.047	0.051	0.055
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0.54 REF			0.021 REF		
L2	0.25			0.010		
$\theta 1$	0°	—	8°	0°	—	8°