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## IRLM220A

### N-Channel A-FET

200 V, 1.13 A, 800 mΩ

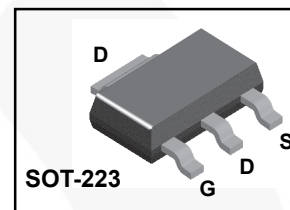
#### FEATURES

- v Avalanche Rugged Technology
- v Rugged Gate Oxide Technology
- v Lower Input Capacitance
- v Improved Gate Charge
- v Extended Safe Operating Area
- v Lower Leakage Current : 10 μA (Max.) @  $V_{DS} = 200V$
- v Lower  $R_{DS(ON)}$  : 0.609 Ω (Typ.)

$$BV_{DSS} = 200 V$$

$$R_{DS(on)} = 0.8 \Omega$$

$$I_D = 1.13 A$$



#### Absolute Maximum Ratings

Symbol	Characteristic	IRLM220ATF	Units
$V_{DSS}$	Drain-to-Source Voltage	200	V
$I_D$	Continuous Drain Current ( $T_A=25^\circ C$ )	1.13	A
	Continuous Drain Current ( $T_A=70^\circ C$ )	0.9	
$I_{DM}$	Drain Current-Pulsed (1)	9	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy (2)	29	mJ
$I_{AR}$	Avalanche Current (1)	1.13	A
$E_{AR}$	Repetitive Avalanche Energy (1)	0.2	mJ
dv/dt	Peak Diode Recovery dv/dt (3)	5	V/ns
$P_D$	Total Power Dissipation ( $T_A=25^\circ C$ ) *	2	W
	Linear Derating Factor *	0.016	W/°C
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +150	°C
$T_L$	Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds	300	

#### Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient *	--	62.5	°C/W

\* When mounted on the minimum pad size recommended (PCB Mount).

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
IRLM220ATF	IRLM220A	SOT-223	Tape and Reel	13 "	12 mm	4000 units

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$BV_{DSS}$	Drain-Source Breakdown Voltage	200	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.18	2.0	V/°C	$I_D=250\mu A$ <b>See Fig 7</b>
$V_{GS(th)}$	Gate Threshold Voltage	1.0	--	100	V	$V_{DS}=5V, I_D=250\mu A$
$I_{GSS}$	Gate-Source Leakage, Forward	--	--	-100	nA	$V_{GS}=20V$
	Gate-Source Leakage, Reverse	--	--	10		$V_{GS}=-20V$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	100	$\mu A$	$V_{DS}=200V$
		--	--	--		$V_{DS}=160V, T_C=125^\circ C$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.8	$\Omega$	$V_{GS}=5V, I_D=0.57A$
$g_{fs}$	Forward Transconductance	--	2.8	--	S	$V_{DS}=40V, I_D=0.57A$
$C_{iss}$	Input Capacitance	--	330	430	pF	$V_{GS}=0V, V_{DS}=25V, f=1MHz$ <b>See Fig 5</b>
$C_{oss}$	Output Capacitance	--	55	70		
$C_{rss}$	Reverse Transfer Capacitance	--	8	30		
$t_{d(on)}$	Turn-On Delay Time	--	6	25	ns	$V_{DD}=100V, I_D=5A,$ $R_G=9\Omega$ <b>See Fig 13 (4)</b>
$t_r$	Rise Time	--	24	20		
$t_{d(off)}$	Turn-Off Delay Time	--	6	60		
$t_f$	Fall Time	--	6	20		
$Q_g$	Total Gate Charge	--	10.3	15	nC	$V_{DS}=160V, V_{GS}=5V,$ $I_D=5A$ <b>See Fig 6 &amp; Fig 12 (4)</b>
$Q_{gs}$	Gate-Source Charge	--	2.0	--		
$Q_{gd}$	Gate-Drain ("Miller") Charge	--	4.4	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$I_S$	Continuous Source Current	--	--	1.13	A	Integral reverse pn-diode in the MOSFET
$I_{SM}$	Pulsed-Source Current (1)	--	--	9		
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$T_J=25^\circ C, I_S=1.13A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	--	140	--	ns	$T_J=25^\circ C, I_F=5A$
$Q_{rr}$	Reverse Recovery Charge	--	0.59	--	$\mu C$	$di_F/dt=100A/\mu s$

### Notes ;

- ① Repetitive rating : pulse-width limited by maximum junction temperature.
- ②  $L = 35\text{ mH}, I_{AS} = 1.13\text{ A}, V_{DD} = 50\text{ V}, R_G = 27\ \Omega,$  starting  $T_J = 25^\circ\text{C}.$
- ③  $I_{SD} \leq 5\text{ A}, di/dt \leq 180\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS},$  starting  $T_J = 25^\circ\text{C}.$
- ④ Essentially independent of operating temperature.

Typical Characteristics

Fig 1. Output Characteristics

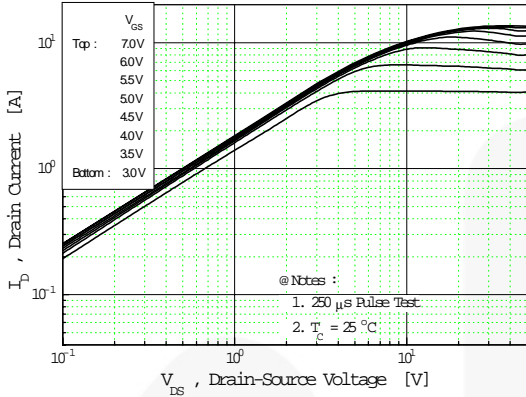


Fig 2. Transfer Characteristics

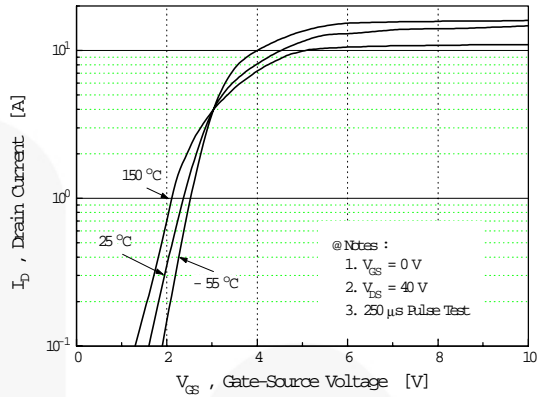


Fig 3. On-Resistance vs. Drain Current

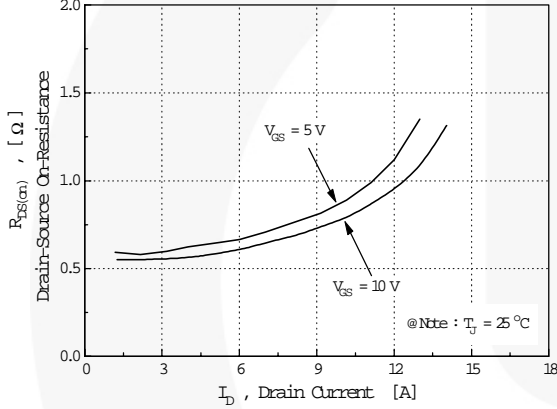


Fig 4. Source-Drain Diode Forward Voltage

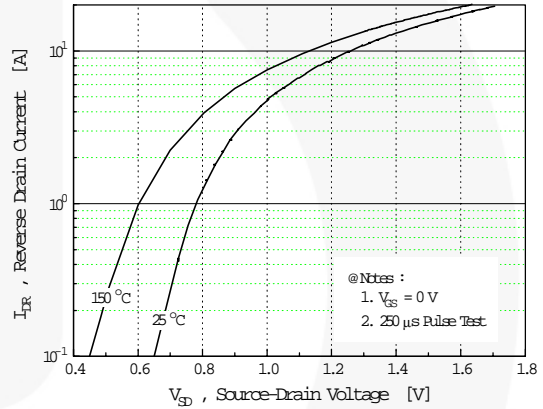


Fig 5. Capacitance vs. Drain-Source Voltage

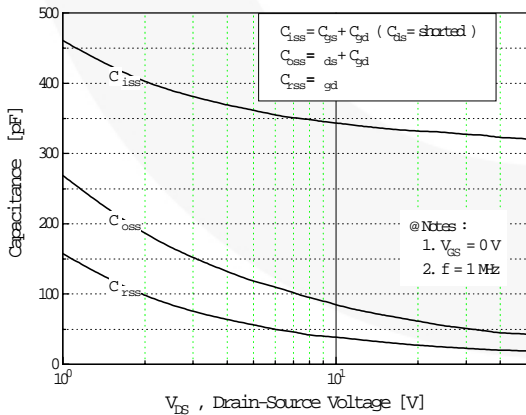
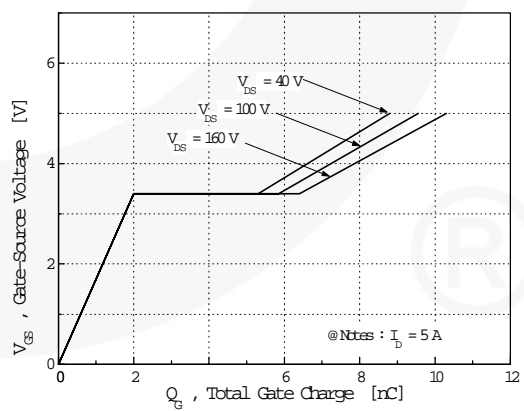


Fig 6. Gate Charge vs. Gate-Source Voltage



Typical Characteristics (Continued)

Fig 7. Breakdown Voltage vs. Temperature

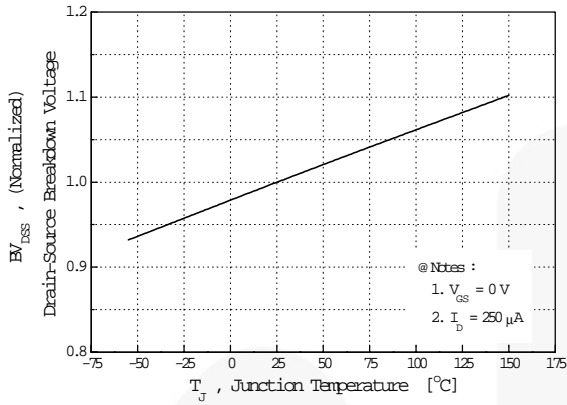


Fig 8. On-Resistance vs. Temperature

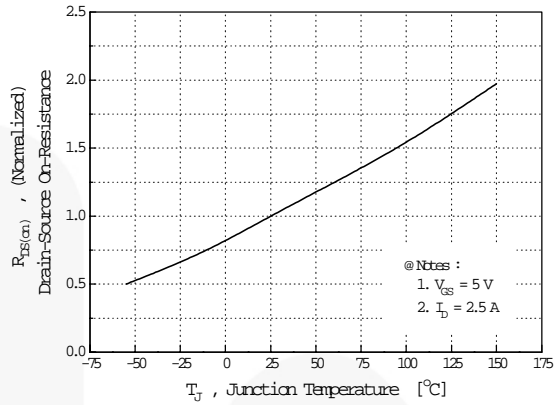


Fig 9. Max. Safe Operating Area

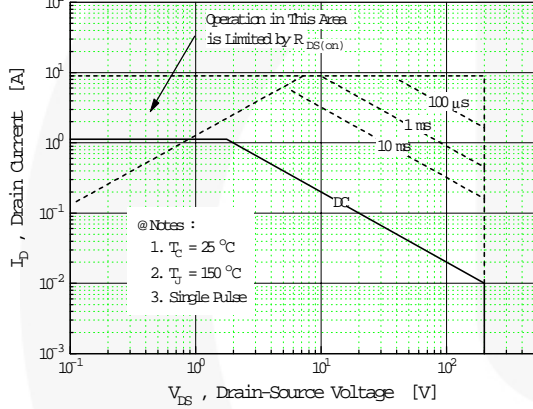


Fig 10. Max. Drain Current vs. Ambient Temperature

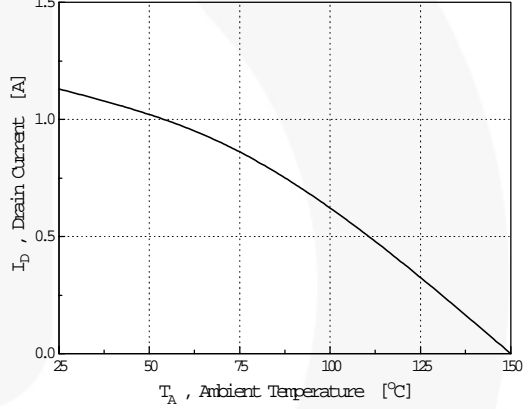
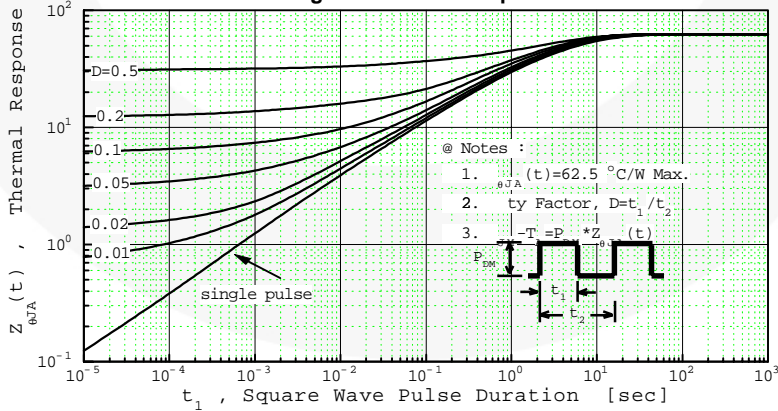


Fig 11. Thermal Response



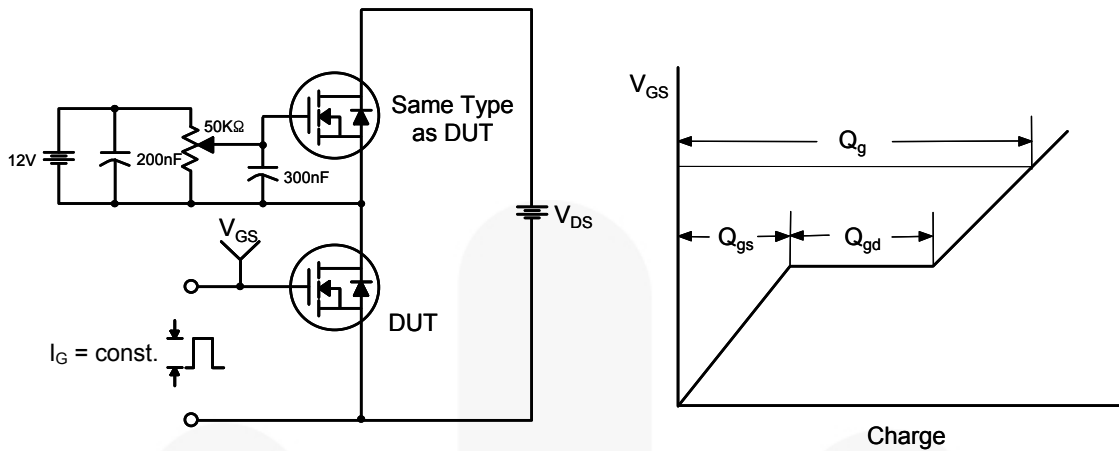


Figure 12. Gate Charge Test Circuit & Waveform

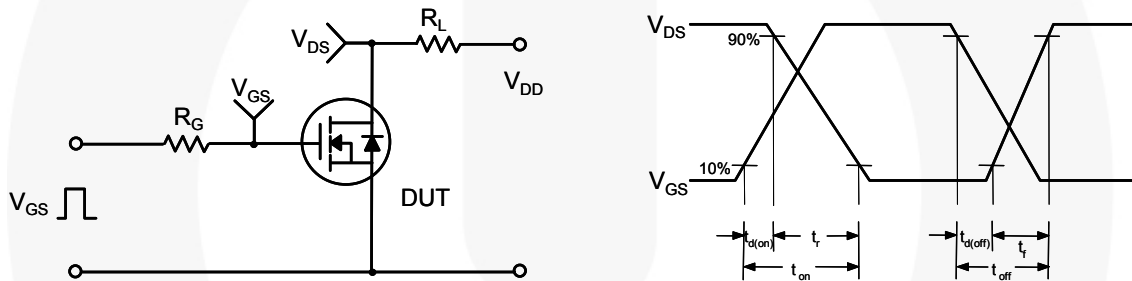


Figure 13. Resistive Switching Test Circuit & Waveforms

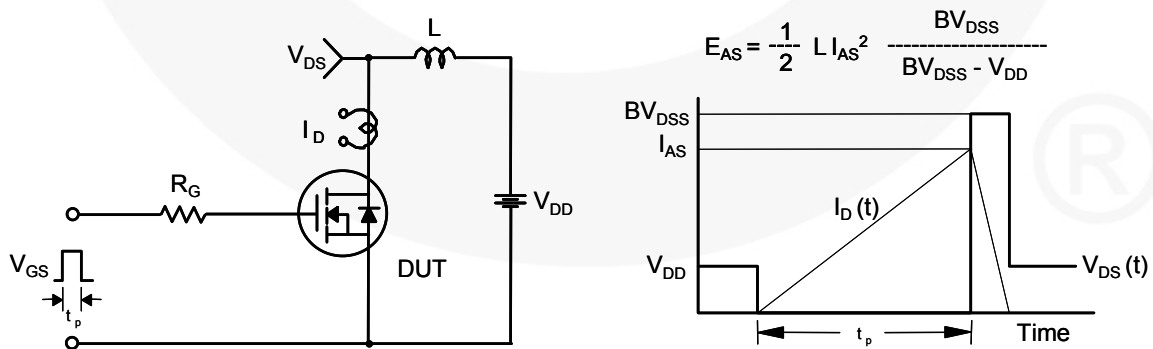


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

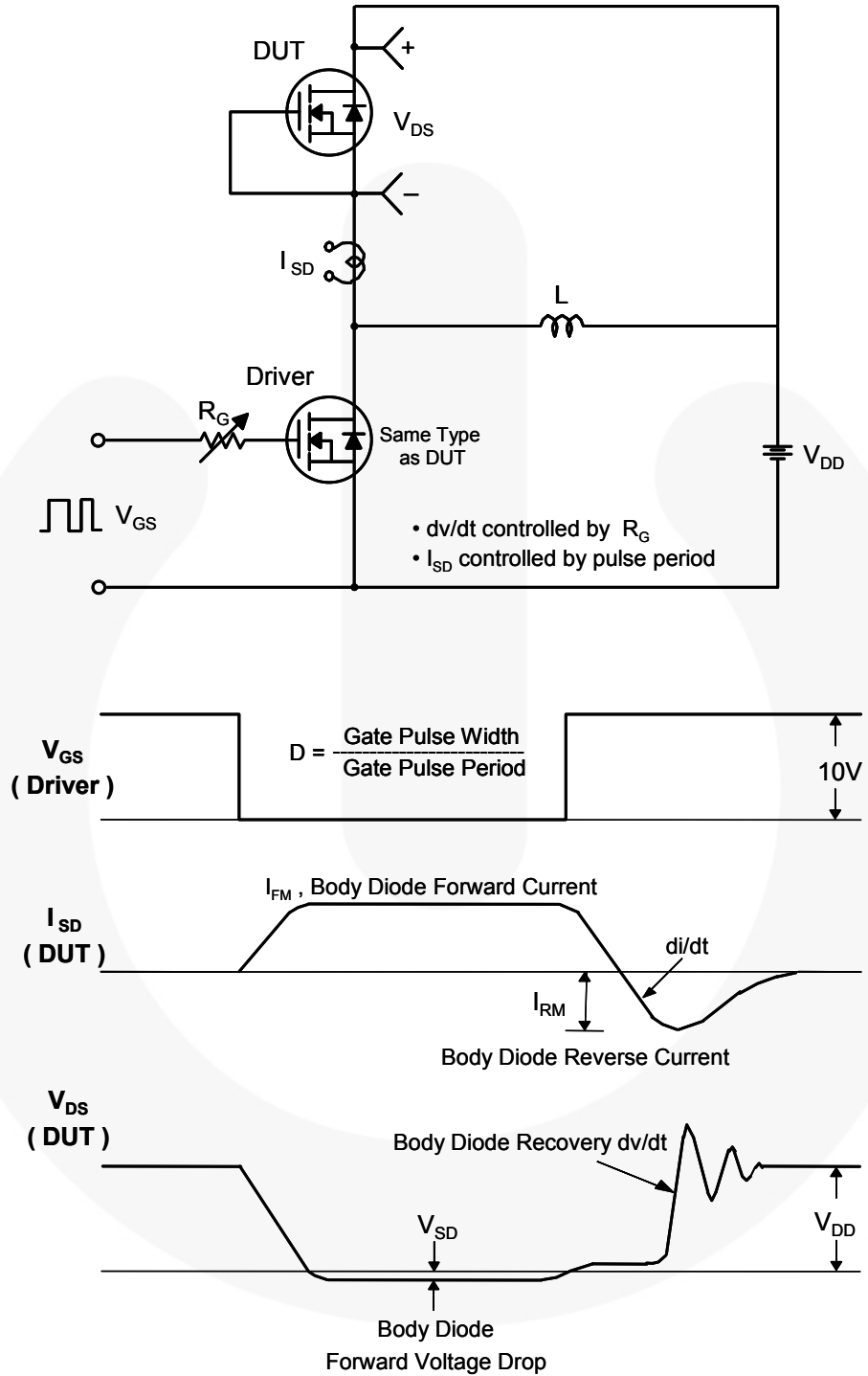
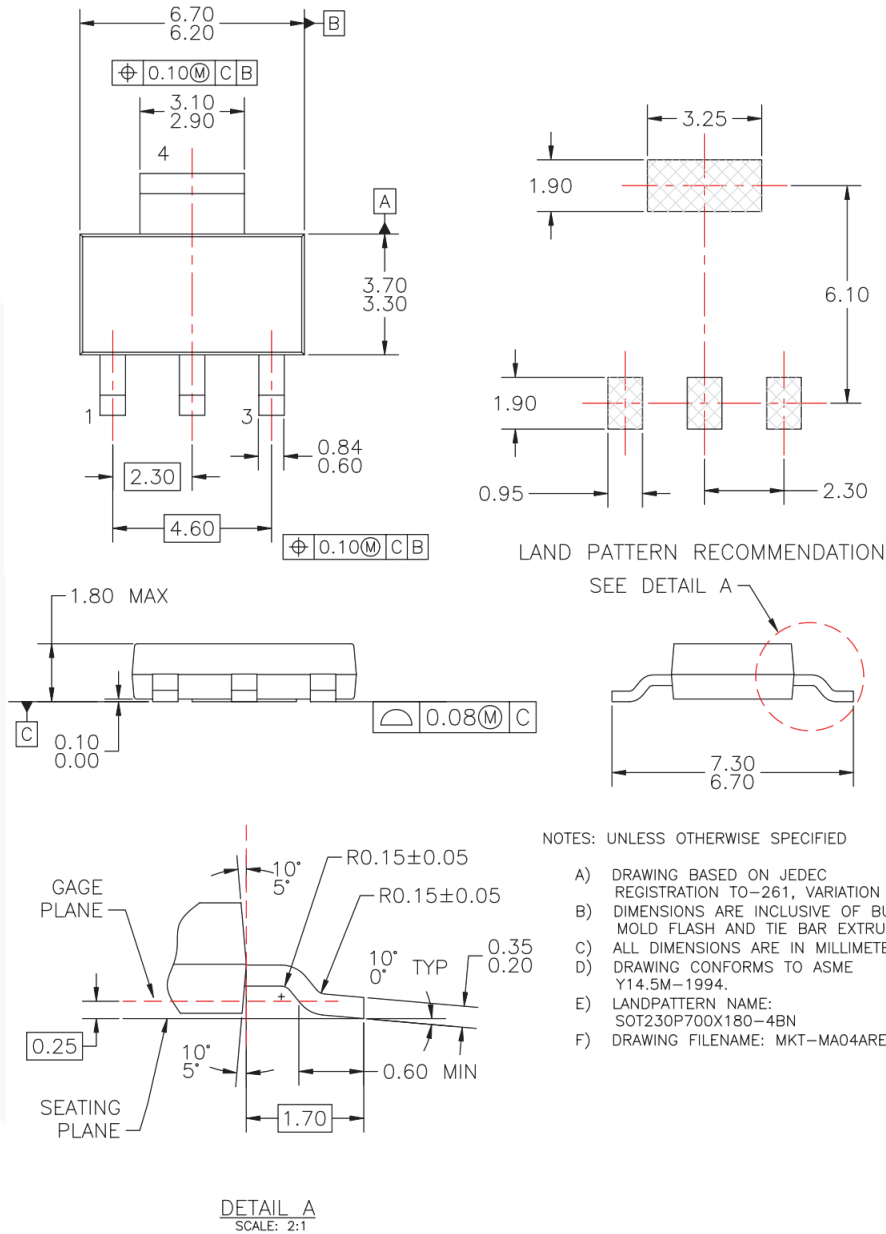


Figure 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

**Mechanical Dimensions**



**Figure 16. SOT-223, Molded, 4-Lead**

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