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IRLM220A

N-Channel A-FET

200 V, 1.13 A, 800 mΩ

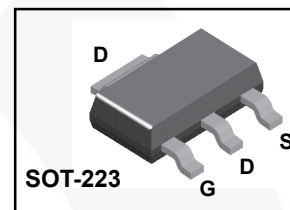
FEATURES

- 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	± 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	$I_D=250\mu A$ See Fig 7
$V_{GS(th)}$	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	μA	$V_{DS}=200V$
		--	--			$V_{DS}=160V, T_C=125^\circ C$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.8	Ω	$V_{GS}=5V, I_D=0.57A$
g_{fs}	Forward Transconductance	--	2.8	--	S	$V_{DS}=40V, I_D=0.57A$
C_{iss}	Input Capacitance	--	330	430	pF	$V_{GS}=0V, V_{DS}=25V, f=1MHz$ See Fig 5
C_{oss}	Output Capacitance	--	55	70		
C_{rss}	Reverse Transfer Capacitance	--	8	30		
$t_{d(on)}$	Turn-On Delay Time	--	6	25	ns	$V_{DD}=100V, I_D=5A,$ $R_G=9\Omega$ See Fig 13 (4)
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	$V_{DS}=160V, V_{GS}=5V,$ $I_D=5A$ See Fig 6 & Fig 12 (4)
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	--	μC	$di_F/dt=100A/\mu s$

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

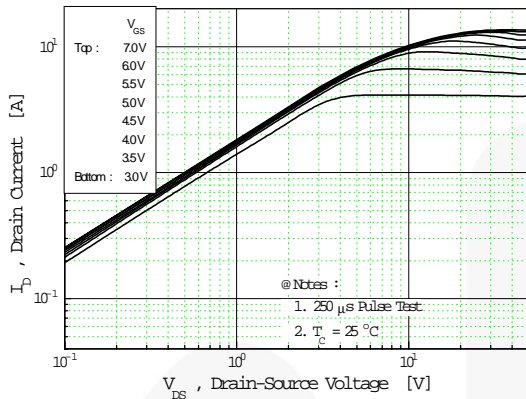


Fig 2. Transfer Characteristics

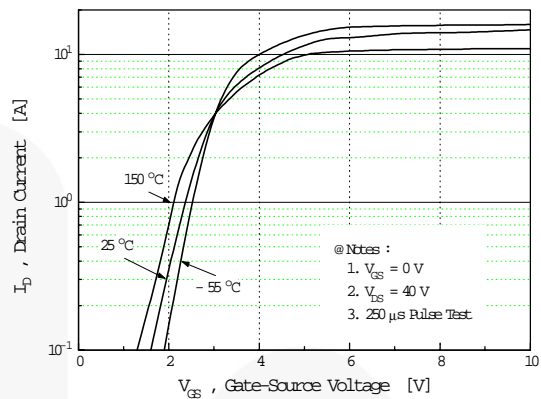


Fig 3. On-Resistance vs. Drain Current

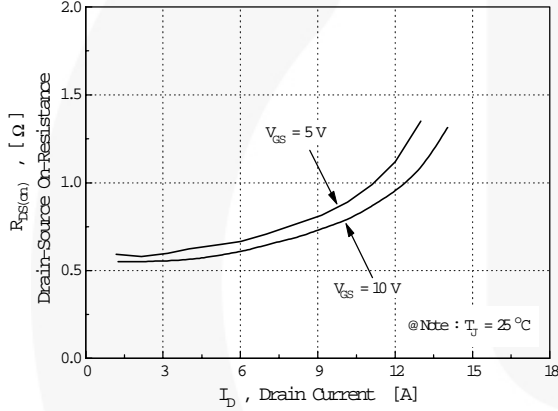


Fig 4. Source-Drain Diode Forward Voltage

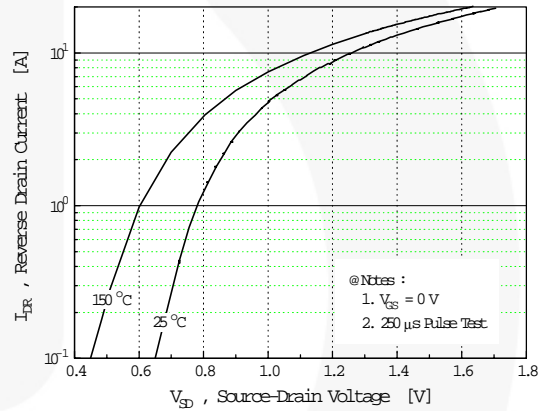


Fig 5. Capacitance vs. Drain-Source Voltage

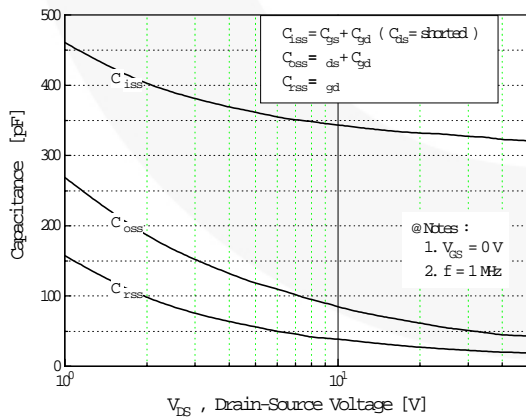
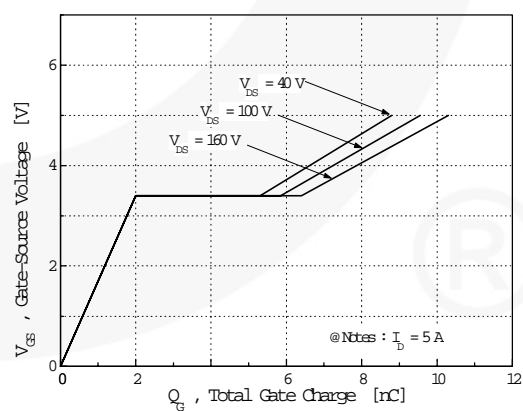


Fig 6. Gate Charge vs. Gate-Source Voltage



Typical Characteristics (Continued)

Fig 7. Breakdown Voltage vs. Temperature

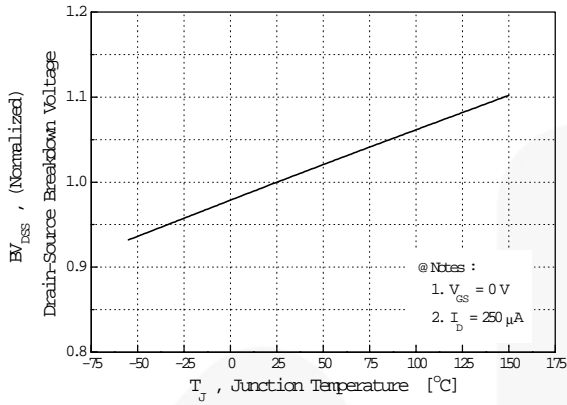


Fig 8. On-Resistance vs. Temperature

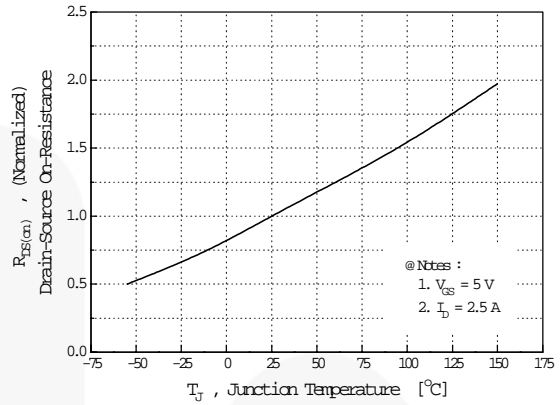


Fig 9. Max. Safe Operating Area

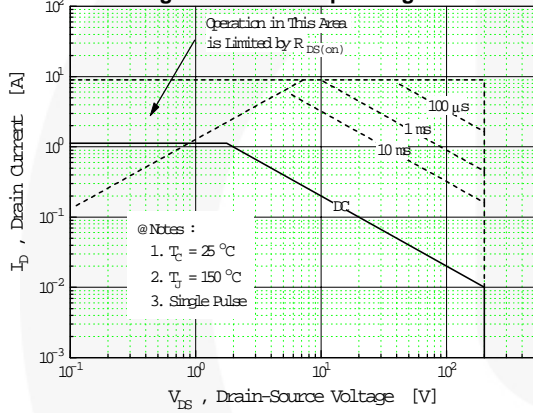


Fig 10. Max. Drain Current vs. Ambient Temperature

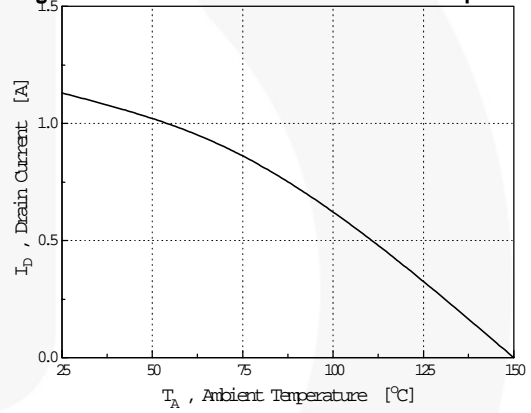
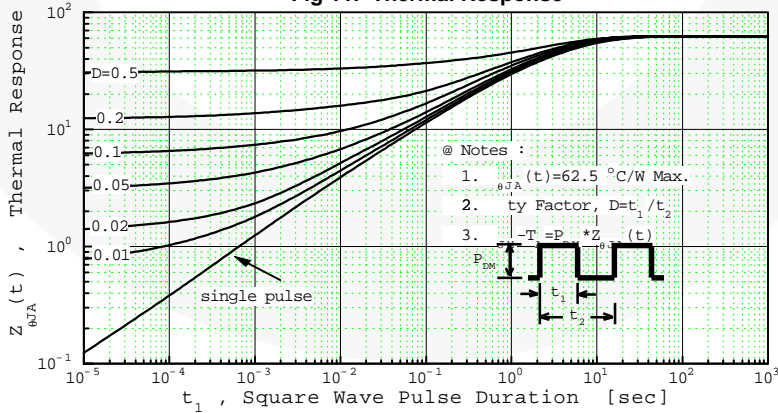


Fig 11. Thermal Response



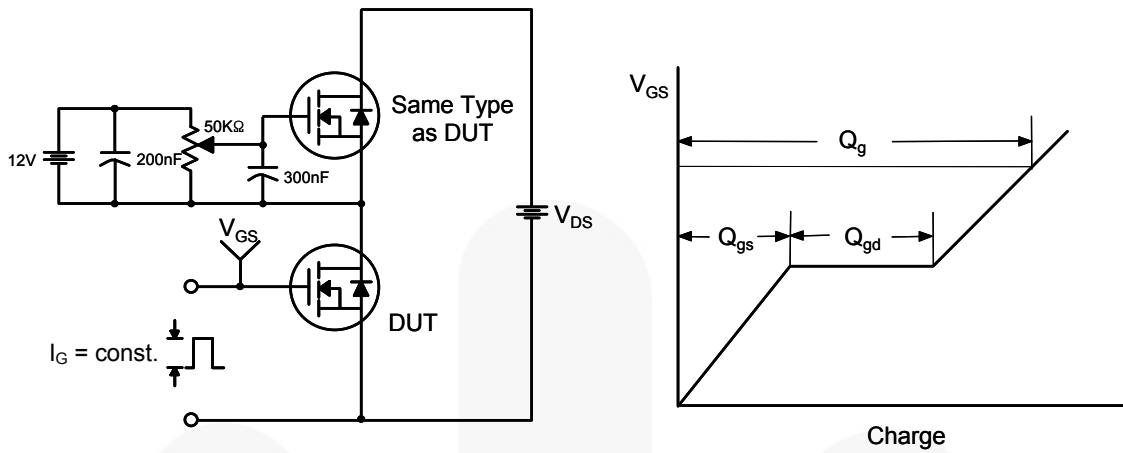


Figure 12. Gate Charge Test Circuit & Waveform

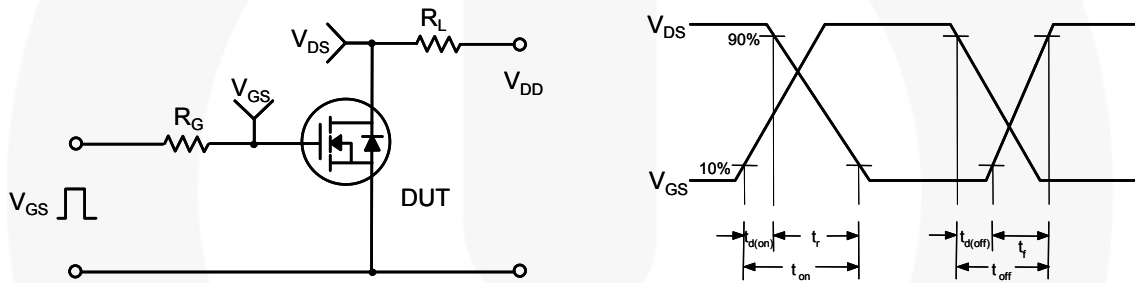


Figure 13. Resistive Switching Test Circuit & Waveforms

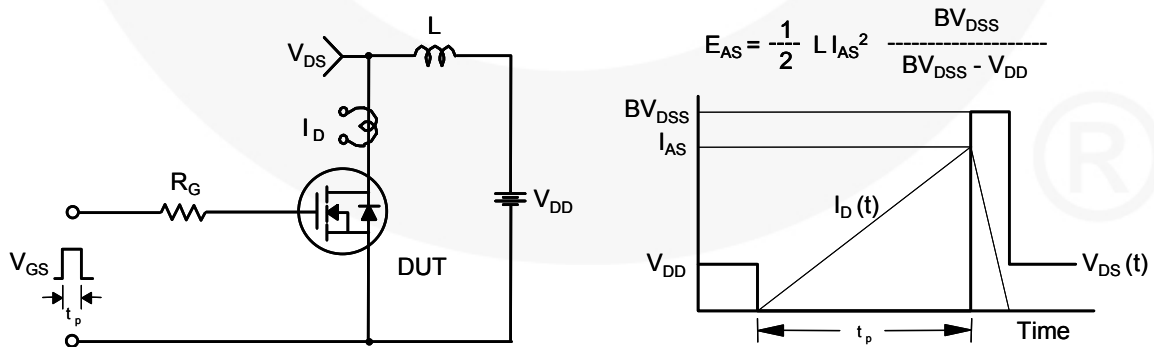


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

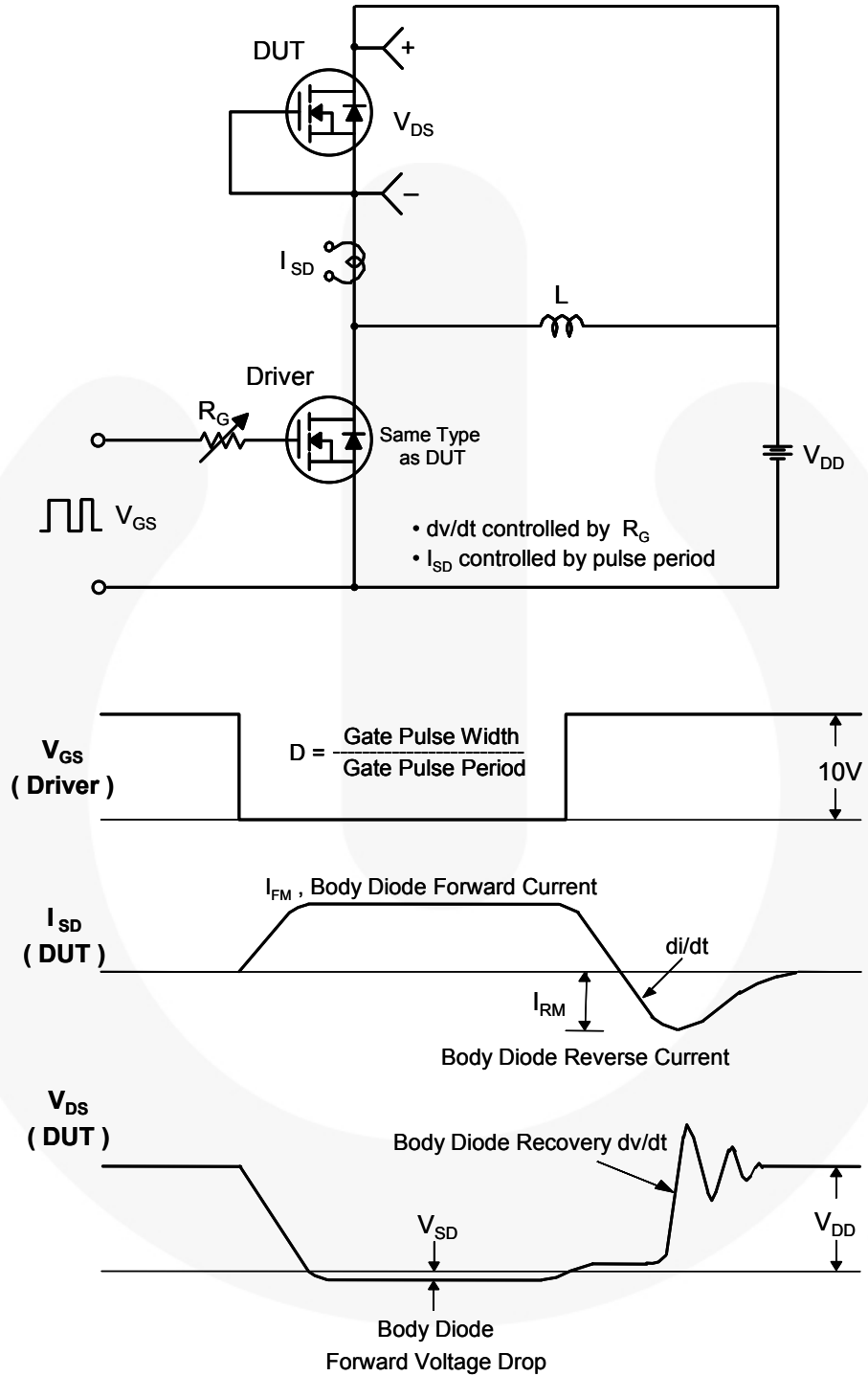


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

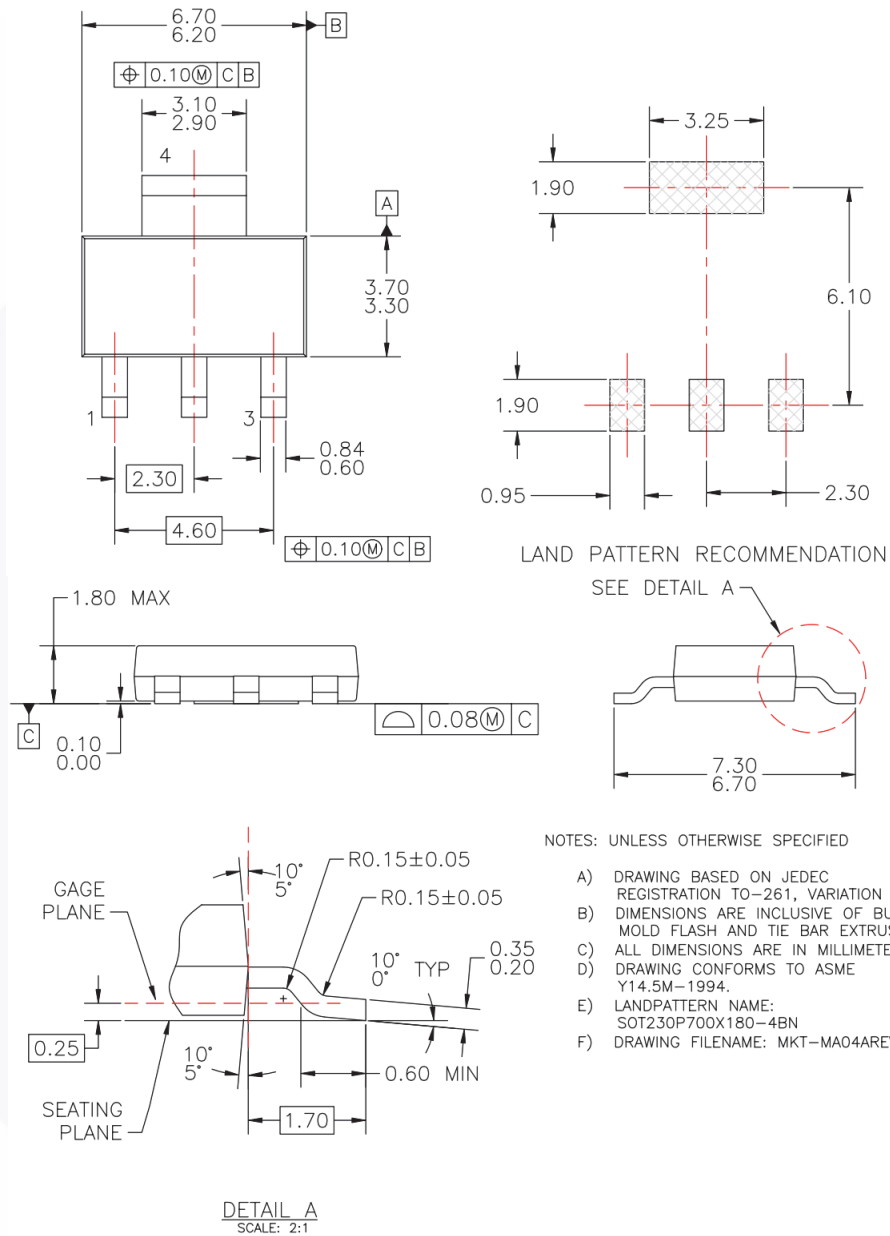


Figure 16. SOT-223, Molded, 4-Lead

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