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Advanced Power MOSFET

IRLM120A

FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μA (Max.) @ V_{DS} = 100V
- Lower $R_{DS(ON)}$: 0.176 Ω (Typ.)

BV_{DSS} = 100 V

$R_{DS(on)}$ = 0.22 Ω

I_D = 2.3 A

SOT-223



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current (T_C=25°C)	2.3	A
	Continuous Drain Current (T_C=70°C)	1.85	
I_{DM}	Drain Current-Pulsed (1)	18	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulsed Avalanche Energy (2)	105	mJ
I_{AR}	Avalanche Current (1)	2.3	A
E_{AR}	Repetitive Avalanche Energy (1)	0.27	mJ
dv/dt	Peak Diode Recovery dv/dt (3)	6.5	V/ns
P_D	Total Power Dissipation (T_C=25°C) *	2.7	W
	Linear Derating Factor *	0.022	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 *	--	46.3	°C/W

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

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Electrical Characteristics (T_C=25 °C unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	100	--	--	V	V_{GS}=0V,I_D=250μA
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.09	--	V/ °C	I_D=250μA ***See Fig 7***
$V_{GS(th)}$	Gate Threshold Voltage	1.0	--	2.0	V	V_{DS}=5V,I_D=250μA
I_{GSS}	Gate-Source Leakage , Forward	--	--	100	nA	V_{GS}=20V
	Gate-Source Leakage , Reverse	--	--	-100		V_{GS}=-20V
I_{DSS}	Drain-to-Source Leakage Current	--	--	10	μA	V_{DS}=100V
		--	--	100		V_{DS}=80V,T_C=125 °C
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.22	Ω	V_{GS}=5V,I_D=1.15A (4)
g_{fs}	Forward Transconductance	--	4.6	--	℧	V_{DS}=40V,I_D=1.15A (4)
C_{iss}	Input Capacitance	--	340	440	pF	V_{GS}=0V,V_{DS}=25V,f =1MHz ***See Fig 5***
C_{oss}	Output Capacitance	--	90	115		
C_{rss}	Reverse Transfer Capacitance	--	39	50		
$t_{d(on)}$	Turn-On Delay Time	--	5	20	ns	V_{DD}=50V,I_D=9.2A, R_G=9 Ω ***See Fig 13*** (4)(5)
t_r	Rise Time	--	10	30		
$t_{d(off)}$	Turn-Off Delay Time	--	19	50		
t_f	Fall Time	--	9	30		
Q_g	Total Gate Charge	--	10.2	15	nC	V_{DS}=80V,V_{GS}=5V, I_D=9.2A ***See Fig 6 & Fig 12*** (4)(5)
Q_{gs}	Gate-Source Charge	--	1.7	--		
Q_{gd}	Gate-Drain (“Miller”) Charge	--	6.0	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	2.3	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current (1)	--	--	18		
V_{SD}	Diode Forward Voltage (4)	--	--	1.5	V	T_J=25 °C,I_S=2.3A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	98	--	ns	T_J=25 °C,I_F=9.2A
Q_{rr}	Reverse Recovery Charge	--	0.34	--	μC	di_F/dt=100A/μs (4)

Notes ;

① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature

② L=30mH, I_{AS}=2.3A, V_{DD}=25V, R_G=27Ω, Starting T_J=25 °C

③ I_{SD} ≤ 9.2A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS} , Starting T_J=25 °C

④ Pulse Test : Pulse Width = 250μs, Duty Cycle ≤ 2%

⑤ Essentially Independent of Operating Temperature

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Fig 1. Output Characteristics

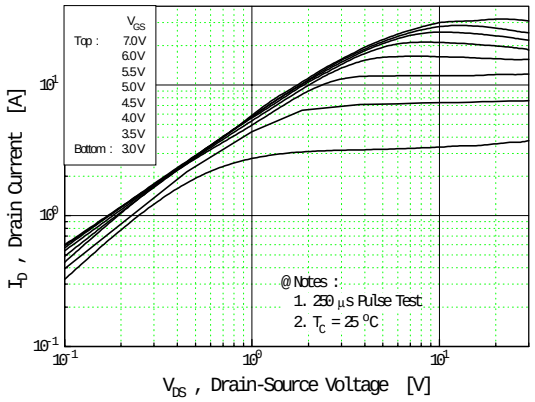


Fig 2. Transfer Characteristics

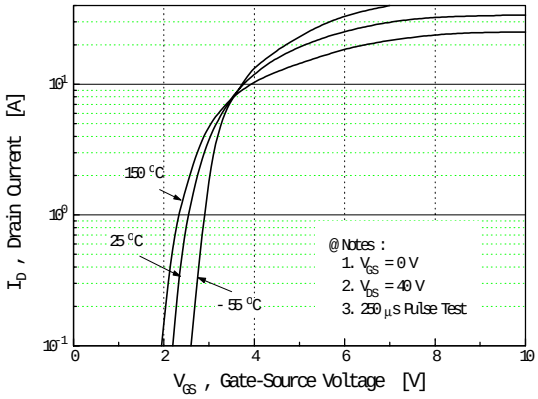


Fig 3. On-Resistance vs. Drain Current

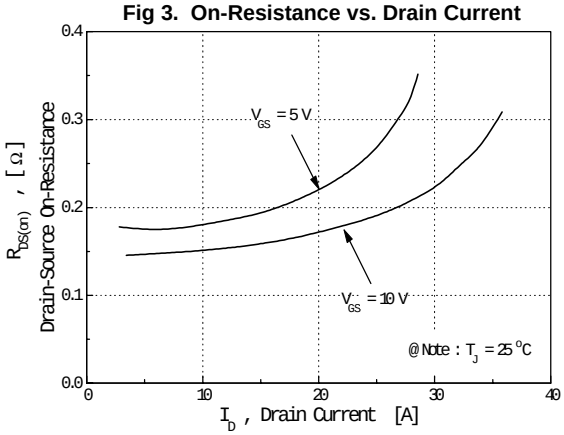


Fig 4. Source-Drain Diode Forward Voltage

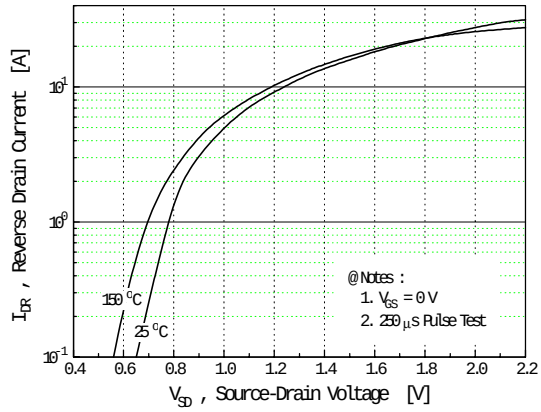


Fig 5. Capacitance vs. Drain-Source Voltage

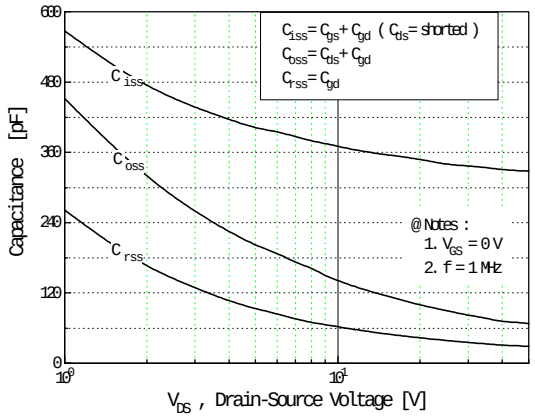
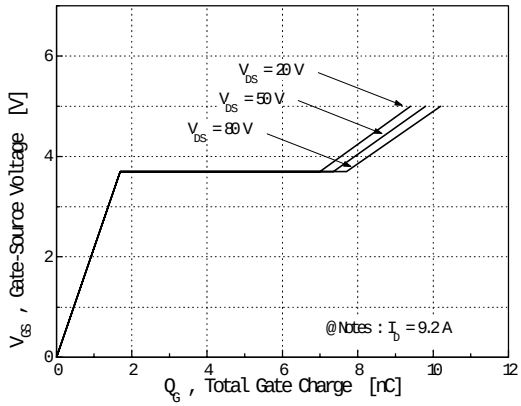


Fig 6. Gate Charge vs. Gate-Source Voltage



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Fig 7. Breakdown Voltage vs. Temperature

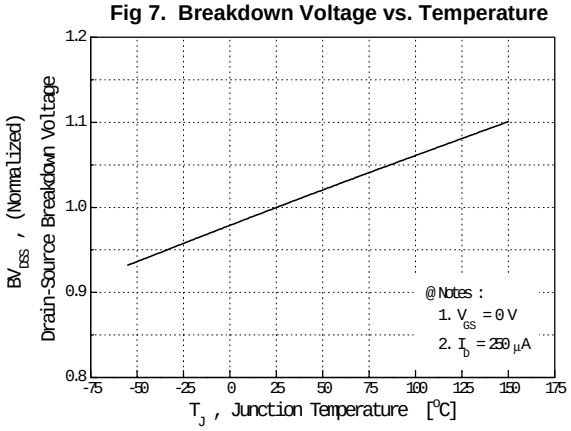


Fig 8. On-Resistance vs. Temperature

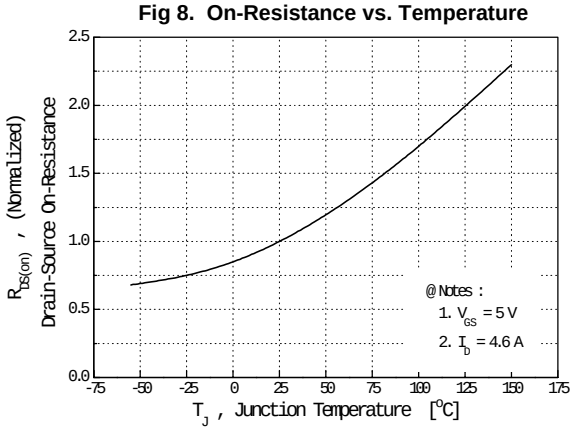


Fig 9. Max. Safe Operating Area

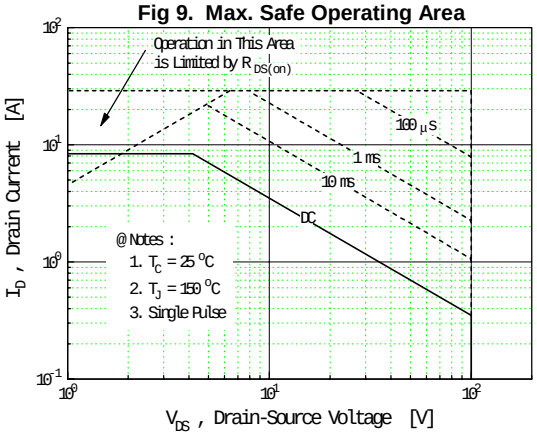


Fig 10. Max. Drain Current vs. Case Temperature

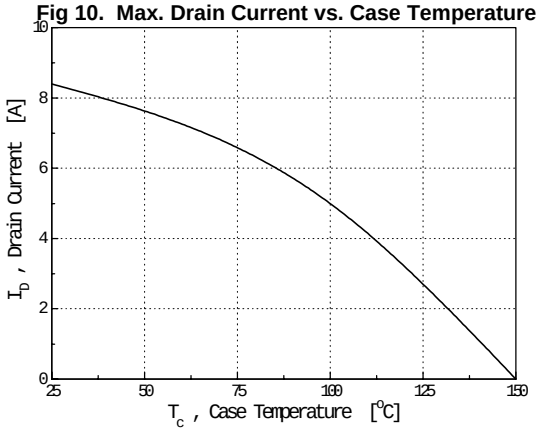
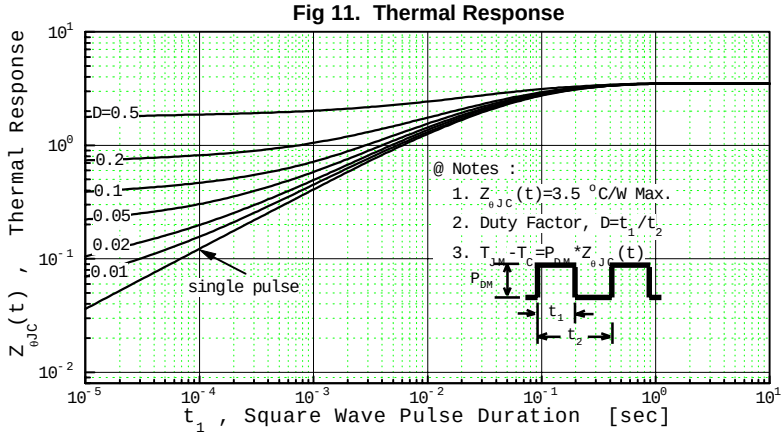


Fig 11. Thermal Response



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Fig 12. Gate Charge Test Circuit & Waveform

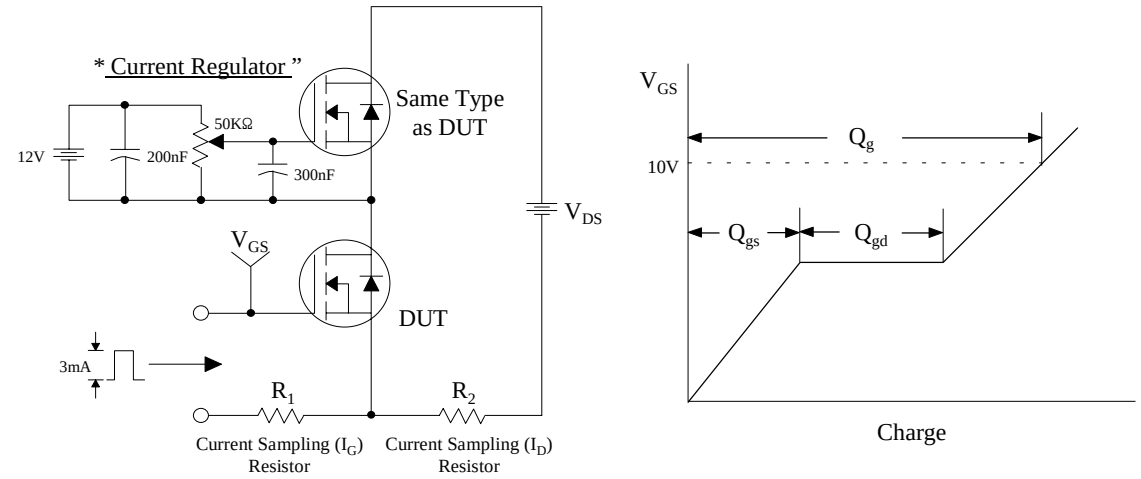


Fig 13. Resistive Switching Test Circuit & Waveforms

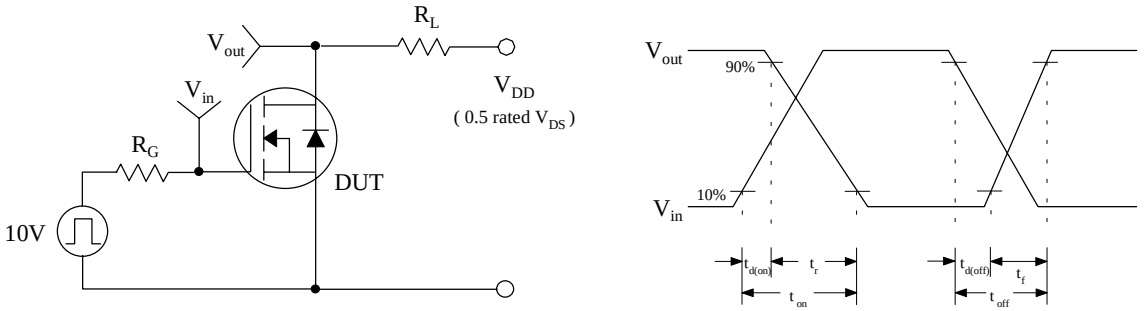


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

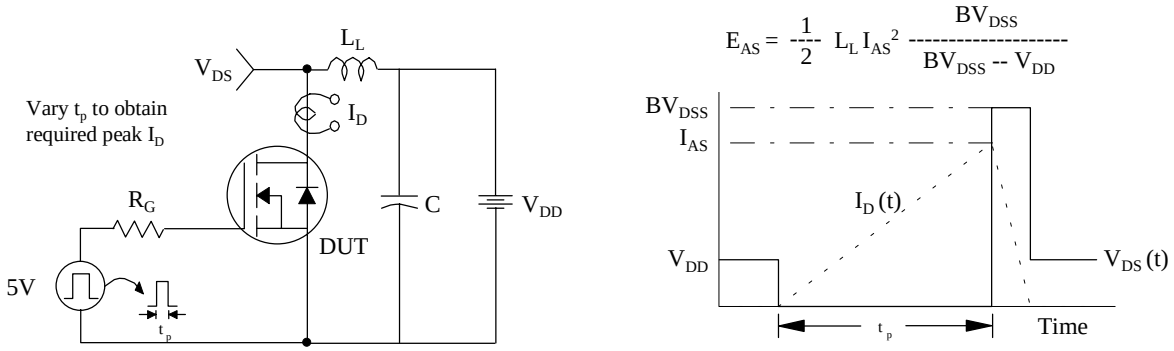
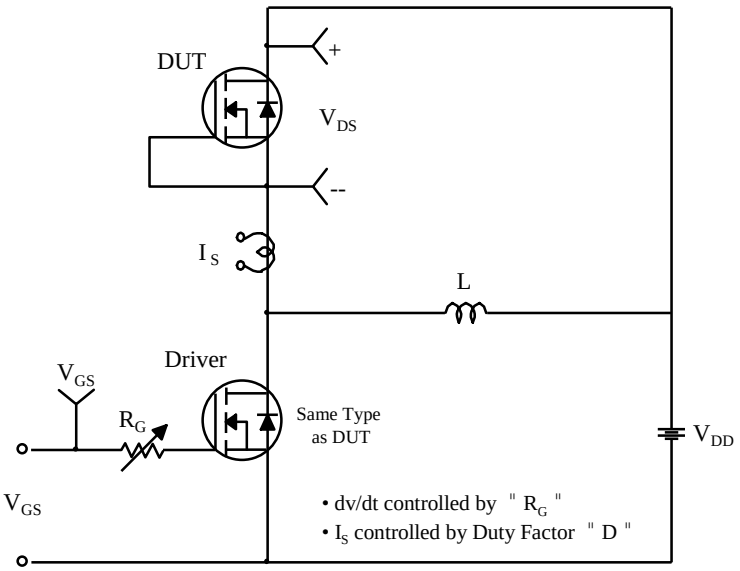
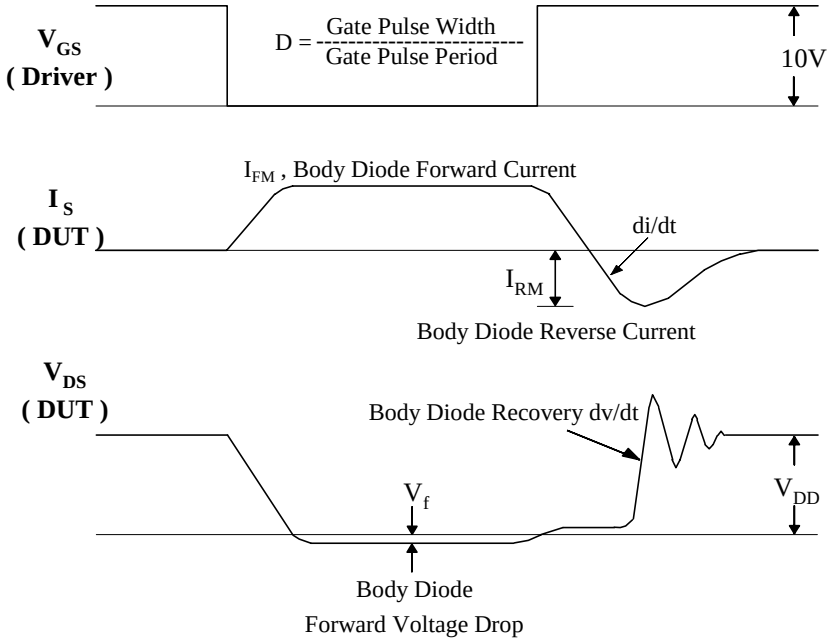


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





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