Advanced Power MOSFET

SSR/U3055A

FEATURES

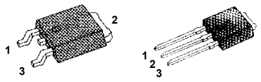
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μA (Max.) @ V_{DS} = 60V
- Lower $R_{DS(ON)}$: 0.097 Ω (Typ.)

BV_{DSS} = 60 V

$R_{DS(on)}$ = 0.15 Ω

I_D = 8 A

D-PAK **I-PAK**



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current (T_C=25°C)	8	A
	Continuous Drain Current (T_C=100°C)	5	
I_{DM}	Drain Current-Pulsed ①	32	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulsed Avalanche Energy ②	55	mJ
I_{AR}	Avalanche Current ①	8	A
E_{AR}	Repetitive Avalanche Energy ①	1.8	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.5	V/ns
P_D	Total Power Dissipation (T_A=25°C) *	2.5	W
	Total Power Dissipation (T_C=25°C)	18	W
	Linear Derating Factor	0.14	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
$R_{\theta JC}$	Junction-to-Case	--	7.04	°C /W
$R_{\theta JA}$	Junction-to-Ambient *	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

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

Electrical Characteristics ($T_C=25^{o}C$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	60	--	--	V	$V_{GS}=0V, I_D=250\ \mu A$
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.060	--	$V/^{o}C$	$I_D=250\ \mu A$ ***See Fig 7***
$V_{GS(th)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=5V, I_D=250\ \mu A$
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	$V_{DS}=60V$
		--	--	100		$V_{DS}=48V, T_C=125\ ^{o}C$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.15	Ω	$V_{GS}=10V, I_D=4A$ ④
g_{fs}	Forward Transconductance	--	6.17	--	℧	$V_{DS}=30V, I_D=4A$ ④
C_{iss}	Input Capacitance	--	280	360	pF	$V_{GS}=0V, V_{DS}=25V, f=1MHz$ ***See Fig 5***
C_{oss}	Output Capacitance	--	110	125		
C_{rss}	Reverse Transfer Capacitance	--	40	46		
$t_{d(on)}$	Turn-On Delay Time	--	11	25	ns	$V_{DD}=30V, I_D=10A,$ $R_G=24\ \Omega$ ***See Fig 13*** ④⑤
t_r	Rise Time	--	17	40		
$t_{d(off)}$	Turn-Off Delay Time	--	27	60		
t_f	Fall Time	--	28	60		
Q_g	Total Gate Charge	--	12	17	nC	$V_{DS}=48V, V_{GS}=10V,$ $I_D=10A$ ***See Fig 6 & Fig 12*** ④⑤
Q_{gs}	Gate-Source Charge	--	2.4	--		
Q_{gd}	Gate-Drain(" Miller ") Charge	--	5.4	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	8	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	32		
V_{SD}	Diode Forward Voltage ④	--	--	1.5	V	$T_J=25^{o}C, I_S=8A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	55	--	ns	$T_J=25^{o}C, I_F=10A$ $di_F/dt=100A/\mu s$ ④
Q_{rr}	Reverse Recovery Charge	--	0.11	--	μC	

Notes ;

① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature

② $L=1mH, I_{AS}=8A, V_{DD}=25V, R_G=27\Omega$, Starting $T_J=25\ ^{o}C$

③ $I_{SD}\leq 10A$, $di/dt\leq 200A/\mu s$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25\ ^{o}C$

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

⑤ Essentially Independent of Operating Temperature

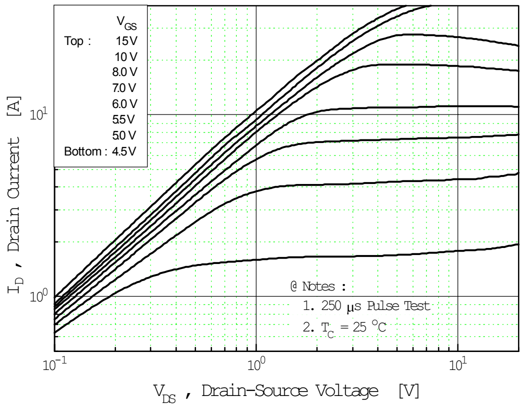


Fig 1. Output Characteristics

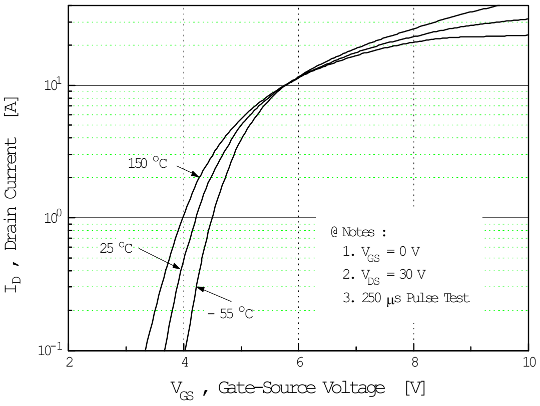


Fig 2. Transfer Characteristics

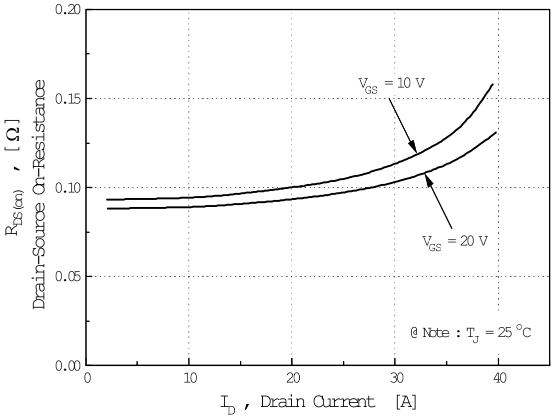


Fig 3. On-Resistance vs. Drain Current

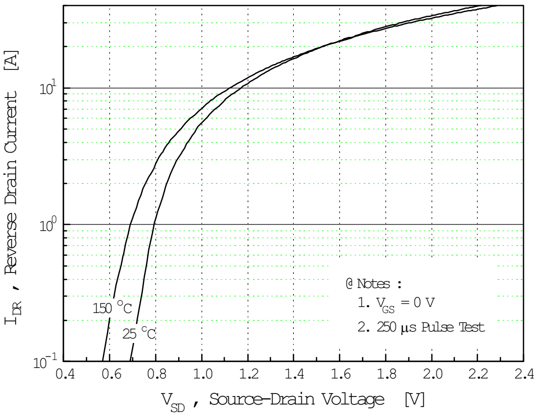


Fig 4. Source-Drain Diode Forward Voltage

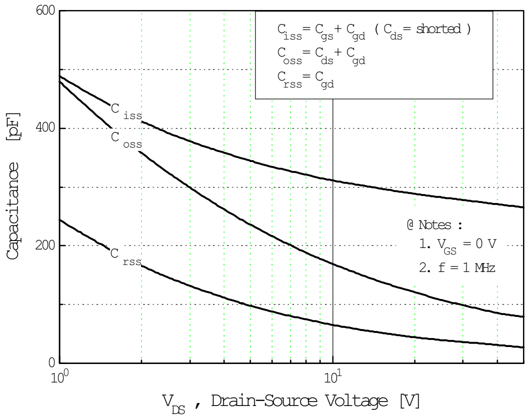


Fig 5. Capacitance vs. Drain-Source Voltage

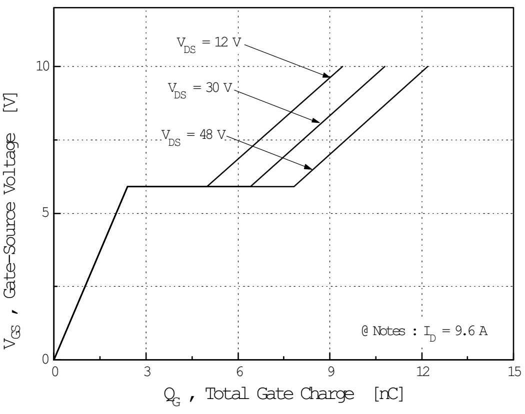


Fig 6. Gate Charge vs. Gate-Source Voltage

Fig 7. Breakdown Voltage vs. Temperature

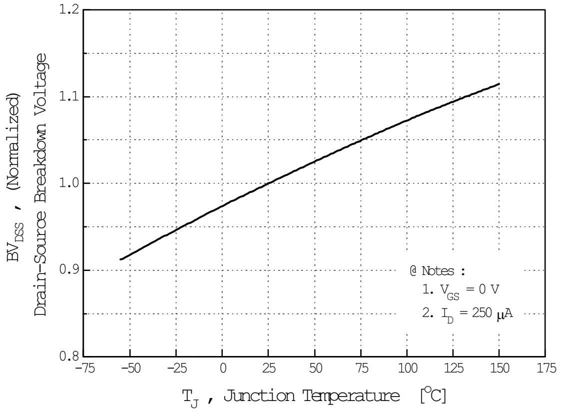


Fig 8. On-Resistance vs. Temperature

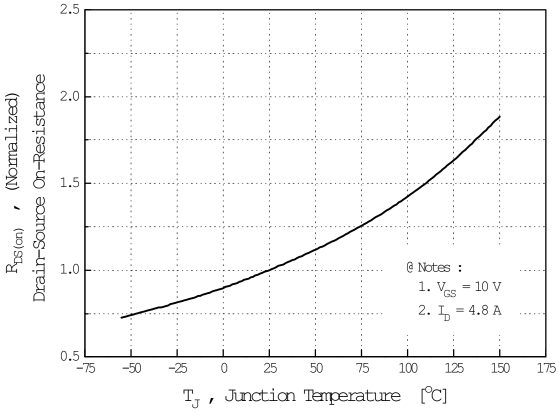


Fig 9. Max. Safe Operating Area

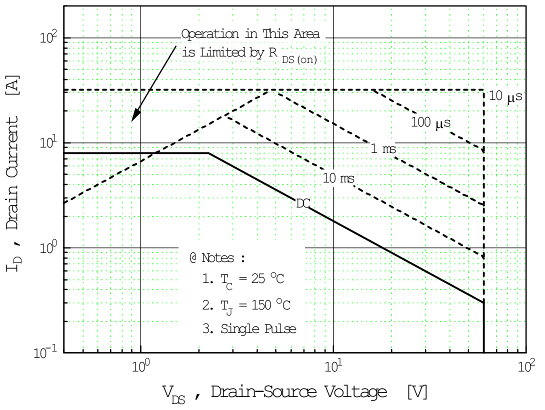


Fig 10. Max. Drain Current vs. Case Temperature

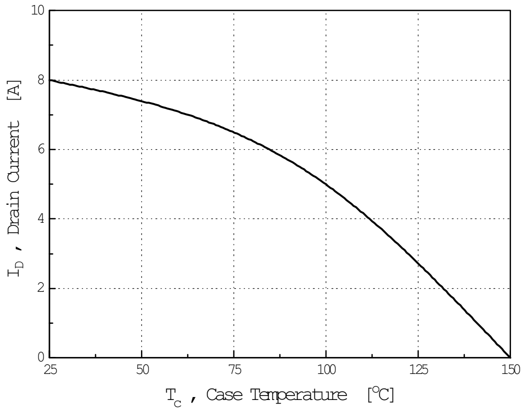


Fig 11. Thermal Response

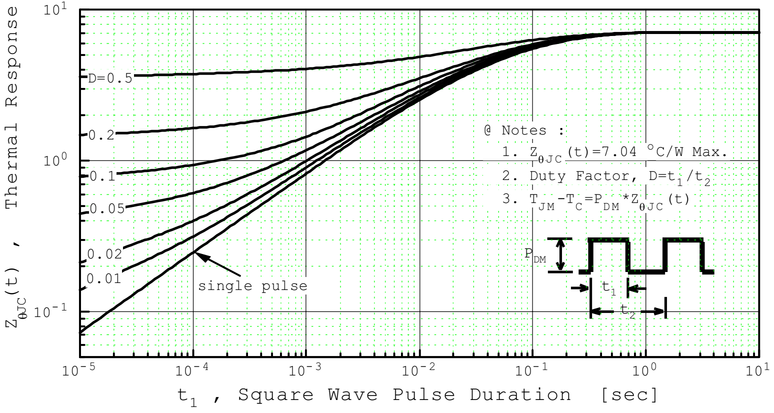


Fig 12. Gate Charge Test Circuit & Waveform

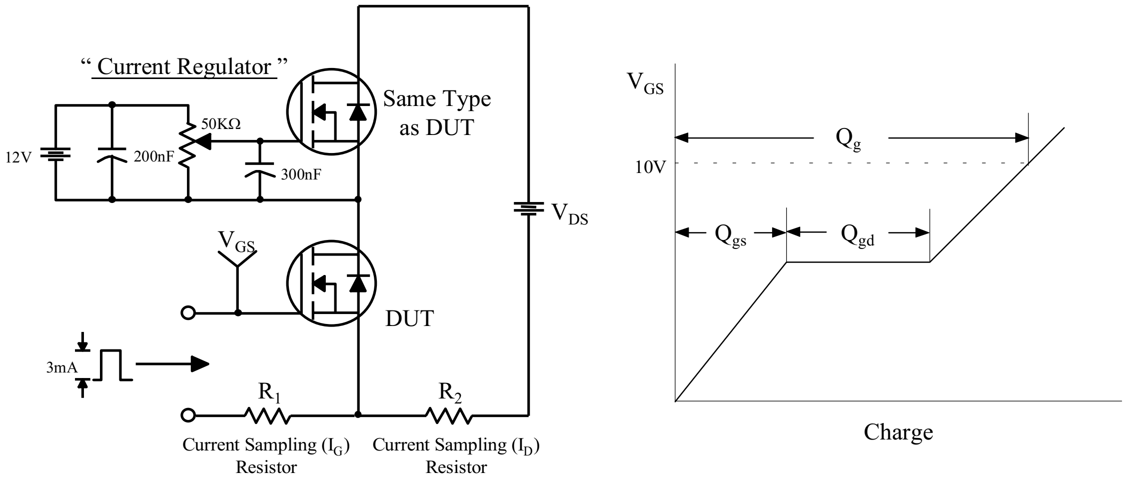


Fig 13. Resistive Switching Test Circuit & Waveforms

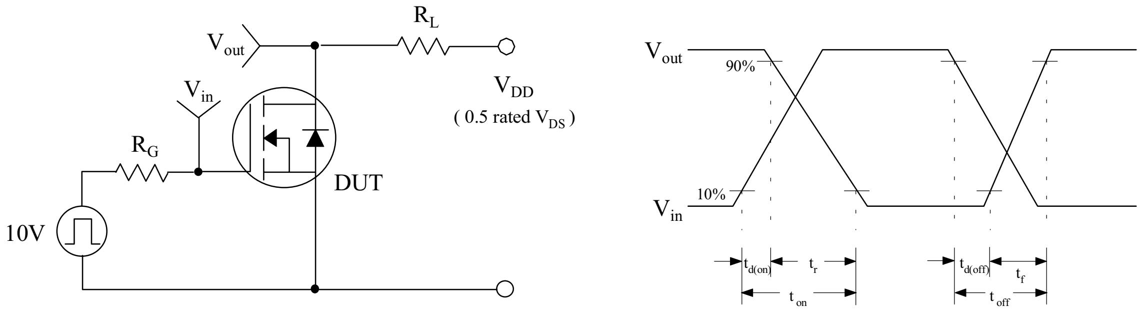


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

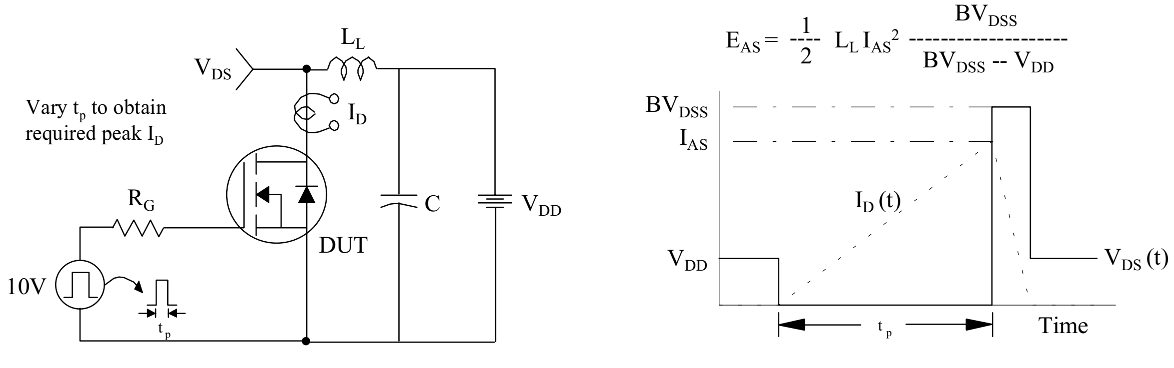


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms