

FEATURES

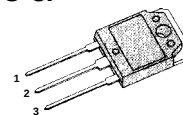
- ❑ Logic-Level Gate Drive
- ❑ Avalanche Rugged Technology
- ❑ Rugged Gate Oxide Technology
- ❑ Lower Input Capacitances
- ❑ Improved Gate Charge
- ❑ Extended Safe Operating Area
- ❑ Lower Leakage Current : 10uA (Max.) @ $V_{DS} = -200V$
- ❑ Lower $R_{DS(ON)}$: 0.175 Ω (Typ.)

$$BV_{DSS} = -200 V$$

$$R_{DS(on)} = 0.23 \Omega$$

$$I_D = -19.5 A$$

TO-3P



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	-200	V
I_D	Continuous Drain Current ($T_C = 25^\circ C$)	-19.5	A
	Continuous Drain Current ($T_C = 100^\circ C$)	-12.3	
I_{DM}	Drain Current-Pulsed ^①	-78	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^②	990	mJ
I_{AR}	Avalanche Current ^①	-19.5	A
E_{AR}	Repetitive Avalanche Energy ^①	20.4	mJ
dv/dt	Peak Diode Recovery dv/dt ^③	-5.0	V/ns
P_D	Total Power Dissipation ($T_C = 25^\circ C$)	204	W
	Linear Derating Factor	1.63	W/ $^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$
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	--	0.61	$^\circ C / W$
$R_{\theta CS}$	Case-to-Sink	0.24	--	
$R_{\theta JA}$	Junction-to-Ambient	--	40	

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

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.	--	-0.17	--	V/°C	$I_D=-250\mu A$ See Fig 7
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	--	-2.0	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	$V_{DS}=-200V$
		--	--	100		$V_{DS}=-160V, T_C=125^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	.175	0.23	Ω	$V_{GS}=-5V, I_D=-9.8A$ ④
g_{fs}	Forward Transconductance	--	13	--	S	$V_{DS}=-40V, I_D=-9.8A$ ④
C_{iss}	Input Capacitance	--	2500	3250	pF	$V_{GS}=0V, V_{DS}=-25V, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	400	520		
C_{rss}	Reverse Transfer Capacitance	--	210	270		
$t_{d(on)}$	Turn-On Delay Time	--	20	50	ns	$V_{DD}=-100V, I_D=-19.5A,$ $R_G=6.2\Omega$ See Fig 13 ④ ⑤
t_r	Rise Time	--	150	310		
$t_{d(off)}$	Turn-Off Delay Time	--	100	210		
t_f	Fall Time	--	65	140		
Q_g	Total Gate Charge	--	90	120	nC	$V_{DS}=-160V, V_{GS}=-5V,$ $I_D=-19.5A$ See Fig 6 & Fig 12 ④ ⑤
Q_{gs}	Gate-Source Charge	--	12	--		
Q_{gd}	Gate-Drain(Miller) Charge	--	54	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	-19.5	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	-78		
V_{SD}	Diode Forward Voltage ④	--	--	-1.5	V	$T_J=25^\circ\text{C}, I_S=-19.5A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	260	--	ns	$T_J=25^\circ\text{C}, I_F=-19.5A, V_{DD}=-160V$
Q_{rr}	Reverse Recovery Charge	--	2.8	--	μC	$di_F/dt=100A/\mu s$ ④

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=3.9\text{mH}, I_{AS}=-19.5A, V_{DD}=-50V, R_G=27\Omega$, Starting $T_J=25^\circ\text{C}$
- ③ $I_{SD}\leq -19.5A, di/dt\leq 500A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

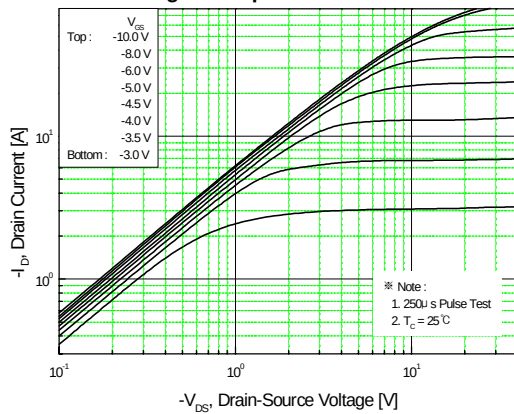


Fig 2. Transfer Characteristics

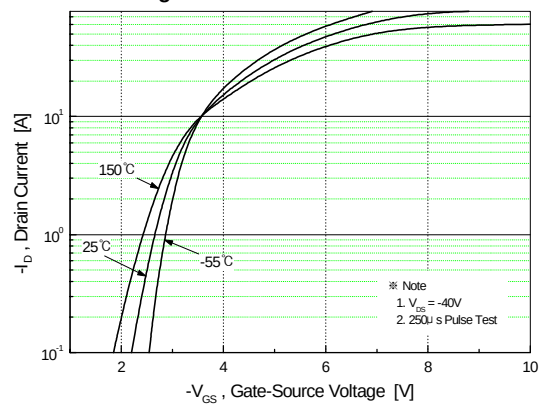


Fig 3. On-Resistance vs. Drain Current

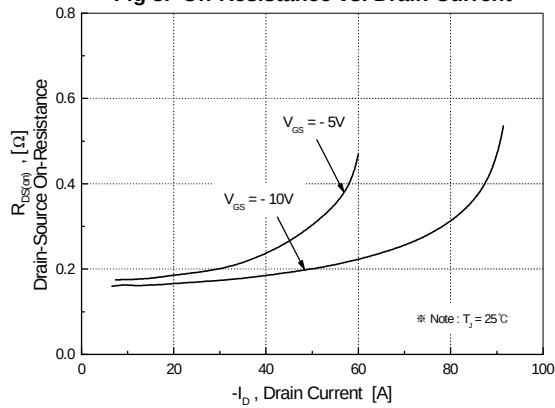


Fig 4. Source-Drain Diode Forward Voltage

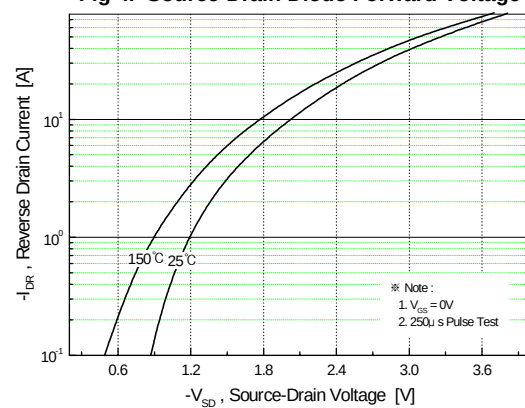


Fig 5. Capacitance vs. Drain-Source Voltage

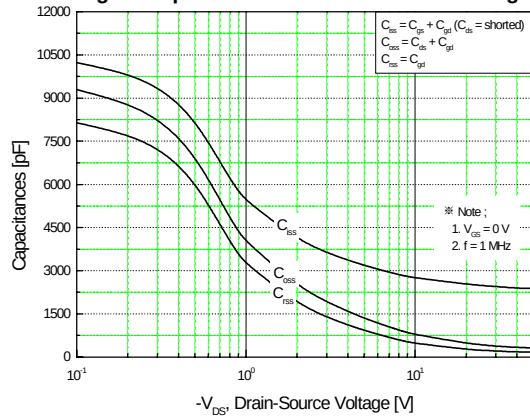


Fig 6. Gate Charge vs. Gate-Source Voltage

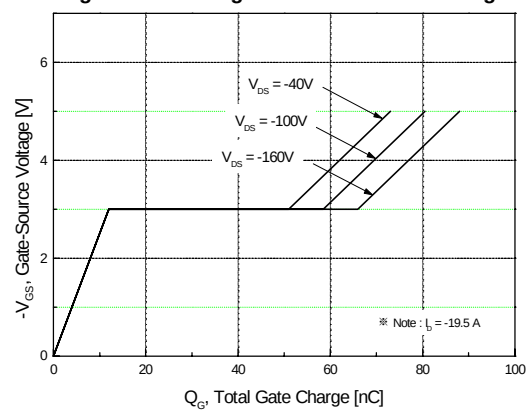


Fig 7. Breakdown Voltage vs. Temperature

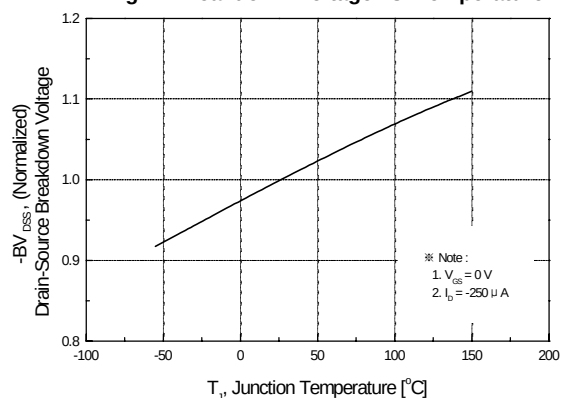


Fig 8. On-Resistance vs. Temperature

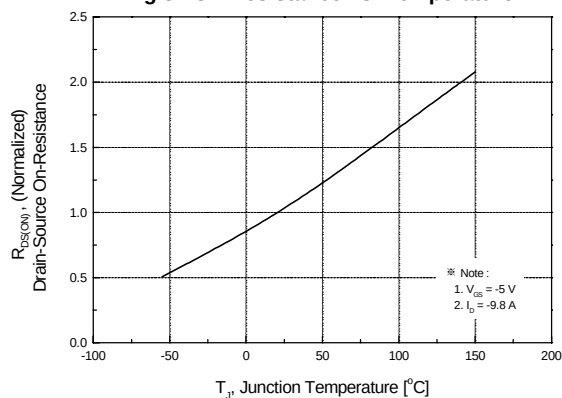


Fig 9. Max. Safe Operating Area

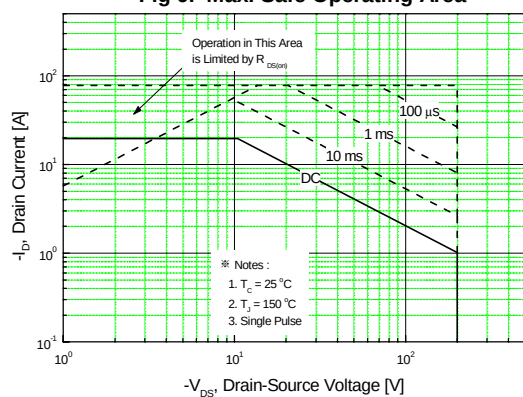


Fig 10. Max. Drain Current vs. Case Temperature

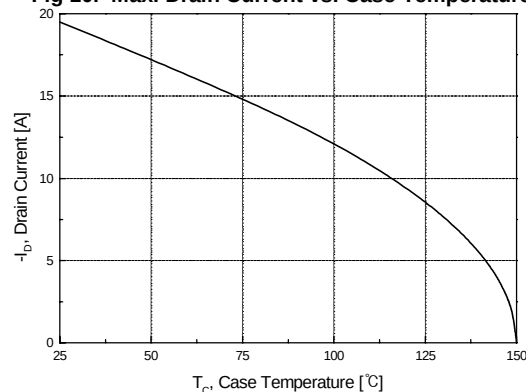


Fig 11. Thermal Response

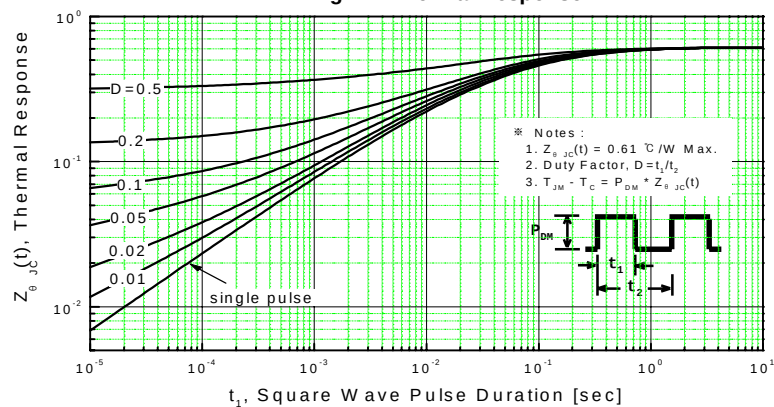


Fig 12. Gate Charge Test Circuit & Waveform

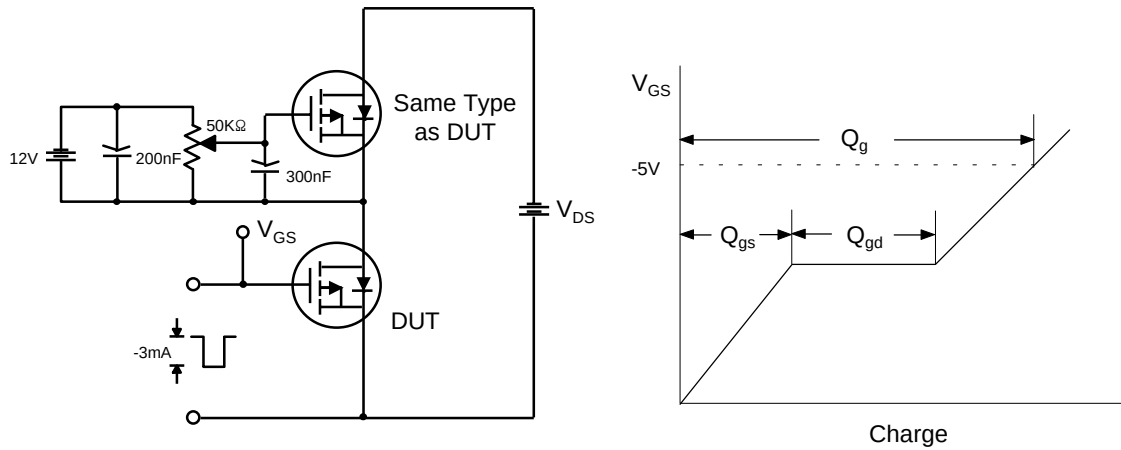


Fig 13. Resistive Switching Test Circuit & Waveforms

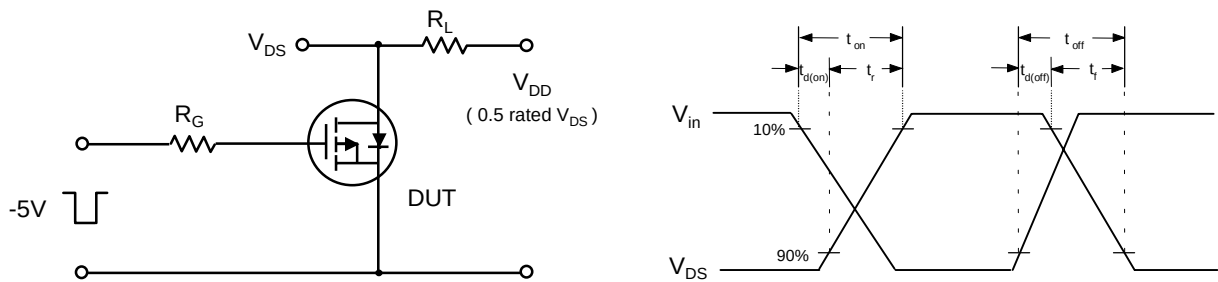


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

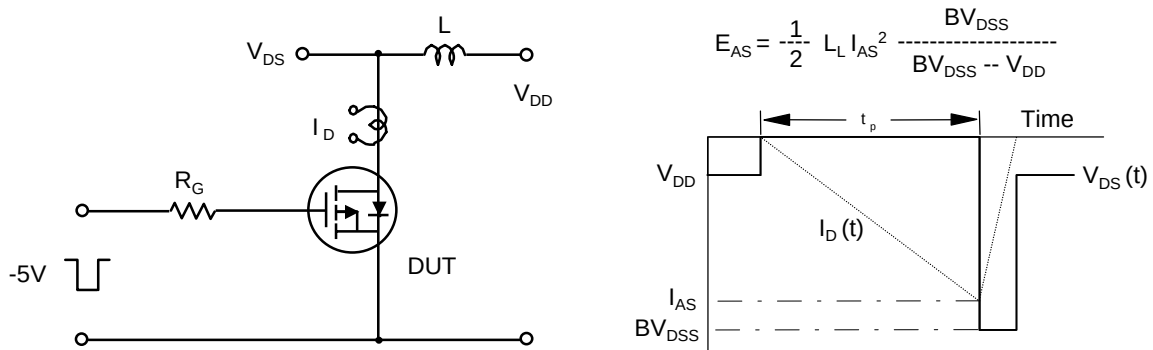
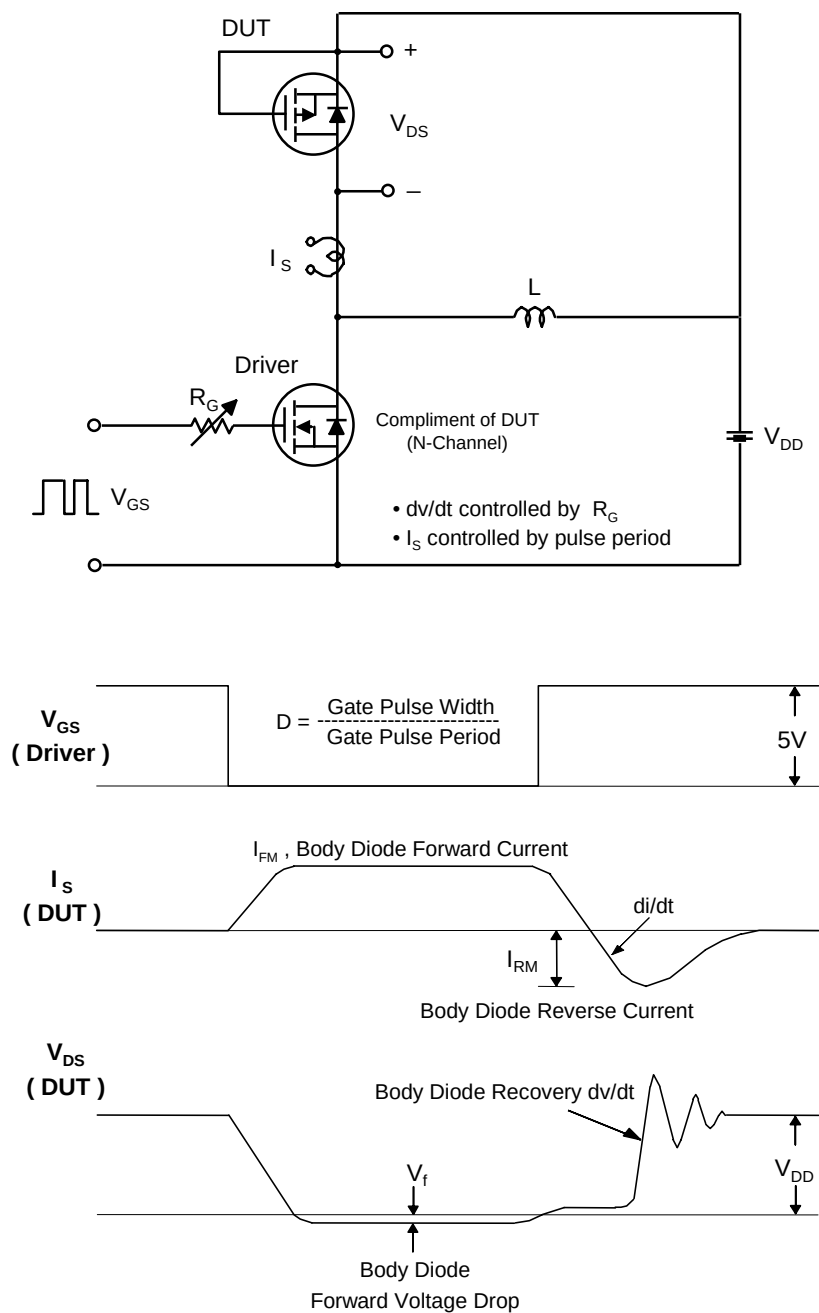


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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