

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 $R_{DS(ON)}$: 0.106 Ω (Typ.)

$BV_{DSS} = -60 V$
 $R_{DS(on)} = 0.14 \Omega$
 $I_D = -14 A$

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 ($T_C=25^\circ C$)	-14	A
	Continuous Drain Current ($T_C=100^\circ C$)	-9.8	
I_{DM}	Drain Current-Pulsed ①	56	A
V_{GS}	Gate-to-Source Voltage	± 25	V
E_{AS}	Single Pulsed Avalanche Energy ②	505	mJ
I_{AR}	Avalanche Current ①	-14	A
E_{AR}	Repetitive Avalanche Energy ①	4.9	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.5	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ C$) *	2.5	W
	Total Power Dissipation ($T_C=25^\circ C$)	49	W
	Linear Derating Factor	0.39	$W/\text{ }^\circ C$
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	--	2.55	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient *	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

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

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POWER MOSFET

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	-60	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=-250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	-0.05	--	V°C	$\text{I}_D=-250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	-2.0	--	-4.0	V	$\text{V}_{\text{DS}}=-5\text{V}, \text{I}_D=-250\mu\text{A}$
I_{GSS}	Gate-Source Leakage , Forward	--	--	-100	nA	$\text{V}_{\text{GS}}=-20\text{V}$
	Gate-Source Leakage , Reverse	--	--	100		$\text{V}_{\text{GS}}=20\text{V}$
I_{DS}	Drain-to-Source Leakage Current	--	--	-10	μA	$\text{V}_{\text{DS}}=-60\text{V}$
		--	--	-100		$\text{V}_{\text{DS}}=-48\text{V}, \text{T}_C=125^\circ\text{C}$
$\text{R}_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	0.14	Ω	$\text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-7.0\text{A}$ ④
g_{fs}	Forward Transconductance	--	8.1	--	S	$\text{V}_{\text{DS}}=-30\text{V}, \text{I}_D=-7.0\text{A}$ ④
C_{iss}	Input Capacitance	--	890	1155	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=-25\text{V}, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	265	400		
C_{rss}	Reverse Transfer Capacitance	--	84	125		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	14	40	ns	$\text{V}_{\text{DD}}=-30\text{V}, \text{I}_D=-18\text{A}, \text{R}_G=12\Omega$ See Fig 13 ④⑤
t_r	Rise Time	--	24	60		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	43	95		
t_f	Fall Time	--	28	65		
Q_g	Total Gate Charge	--	30	38	nC	$\text{V}_{\text{DS}}=-48\text{V}, \text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-18\text{A}$ See Fig 6 & Fig 12 ④⑤
Q_{gs}	Gate-Source Charge	--	5.3	--		
Q_{gd}	Gate-Drain("Miller") Charge	--	12	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_s	Continuous Source Current	--	--	-14	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	-56		
V_{SD}	Diode Forward Voltage ④	--	--	-3.9	V	$\text{T}_J=25^\circ\text{C}, \text{I}_s=-14\text{A}, \text{V}_{\text{GS}}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	85	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=-18\text{A}$
Q_{rr}	Reverse Recovery Charge	--	0.25	--	μC	$d\text{i}_F/dt=100\text{A}/\mu\text{s}$ ④

Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=3.0\text{mH}, \text{I}_{\text{AS}}=-14\text{A}, \text{V}_{\text{DD}}=-25\text{V}, \text{R}_G=27\Omega^*$, Starting $\text{T}_J=25^\circ\text{C}$
- ③ $\text{I}_{\text{SD}} \leq -18\text{A}, d\text{i}/dt \leq 300\text{A}/\mu\text{s}, \text{V}_{\text{DD}} \leq \text{BV}_{\text{DSS}}$, Starting $\text{T}_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = $250\mu\text{s}$, Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

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Fig 1. Output Characteristics

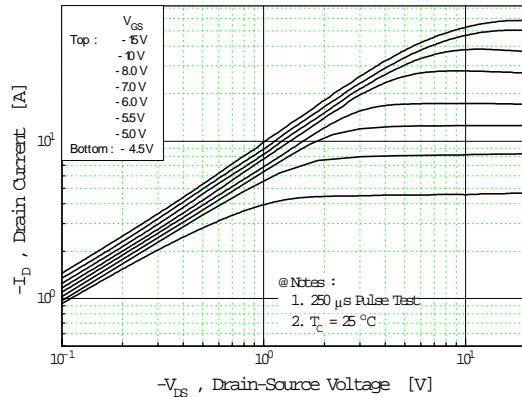


Fig 2. Transfer Characteristics

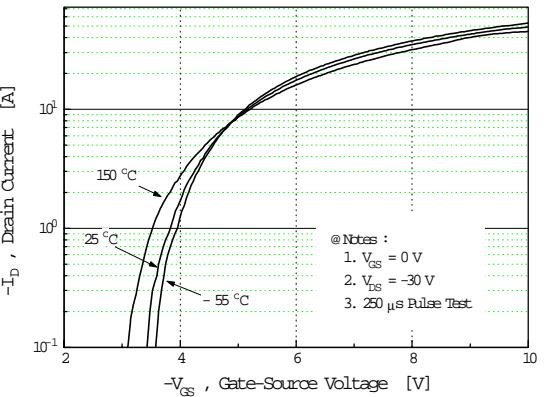


Fig 3. On-Resistance vs. Drain Current

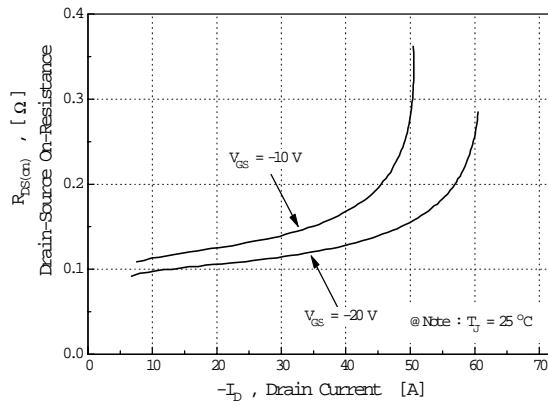


Fig 4. Source-Drain Diode Forward Voltage

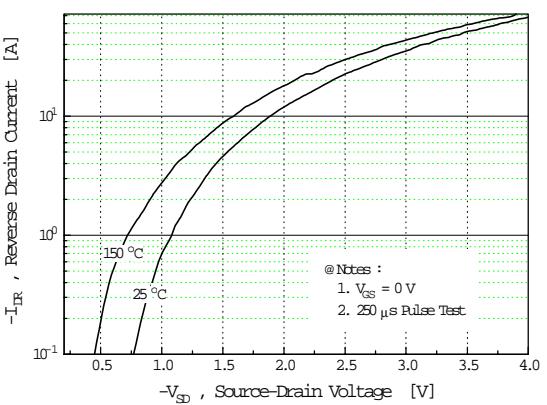


Fig 5. Capacitance vs. Drain-Source Voltage

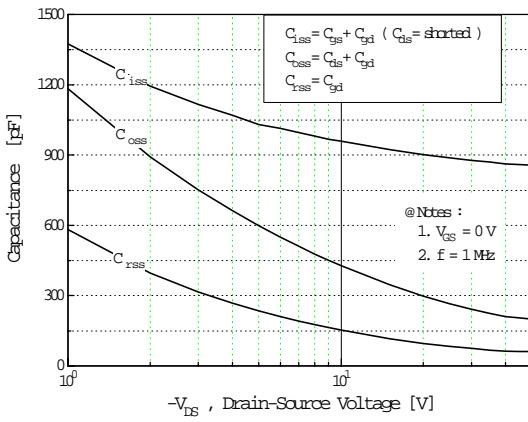


Fig 6. Gate Charge vs. Gate-Source Voltage

