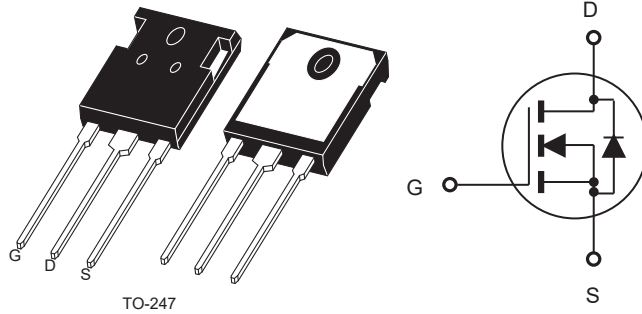


N-Channel Enhancement Mode Field Effect Transistor

FEATURES

- 650V, 47A, $R_{DS(ON)} = 70m\Omega$ @ $V_{GS} = 10V$.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- RoHS compliant.
- TO-247 package.



ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current-Continuous @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	I_D	47 30	A A
Drain Current-Pulsed ^a	I_{DM}	188	A
Maximum Power Dissipation @ $T_C = 25^\circ C$ - Derate above $25^\circ C$	P_D	390 3.1	W W/ $^\circ C$
Single Pulsed Avalanche Energy ^d	E_{AS}	300	mJ
Single Pulsed Avalanche Current ^d	I_{AS}	4	A
Operating and Store Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.32	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ C/W$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
On Characteristics^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		56	70	m Ω
Dynamic Characteristics^c						
Input Capacitance	C_{iss}	$V_{DS} = 100V, V_{GS} = 0V, f = 1MHz$		2905		pF
Output Capacitance	C_{oss}			160		pF
Reverse Transfer Capacitance	C_{rss}			5		pF
Switching Characteristics^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 520V, I_D = 10A, V_{GS} = 10V, R_{GEN} = 10\Omega$		42		ns
Turn-On Rise Time	t_r			21		ns
Turn-Off Delay Time	$t_{d(off)}$			124		ns
Turn-Off Fall Time	t_f			5		ns
Total Gate Charge	Q_g	$V_{DS} = 520V, I_D = 10A, V_{GS} = 10V$		79		nC
Gate-Source Charge	Q_{gs}			18		nC
Gate-Drain Charge	Q_{gd}			25		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S				47	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 20A$			1.5	V
Reverse Recovery Time	T_{rr}	$V_R = 400V, I_F = 23A, dl_F/dt = 100A/us$		386		ns
Reverse Recovery Charge	Q_{rr}			8.7		nC
Peak Reverse Recovery Current	I_{rrm}			44.2		A
Notes : a.Repetitive Rating : Pulse width limited by maximum junction temperature. b.Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$. c.Guaranteed by design, not subject to production testing. d.L = 37.5mH, $I_{AS} = 4A, V_{DD} = 60V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.						

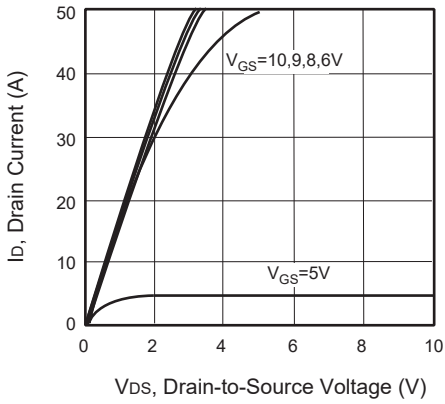


Figure 1. Output Characteristics

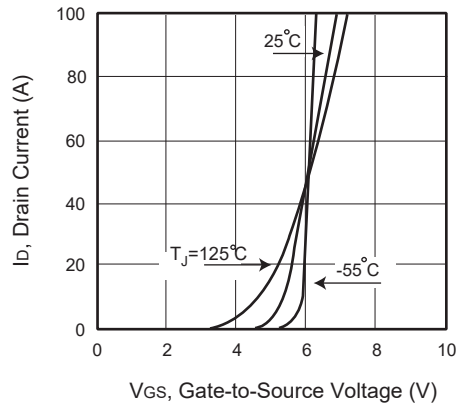


Figure 2. Transfer Characteristics

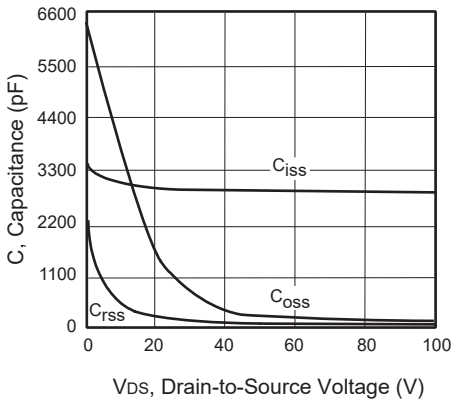


Figure 3. Capacitance

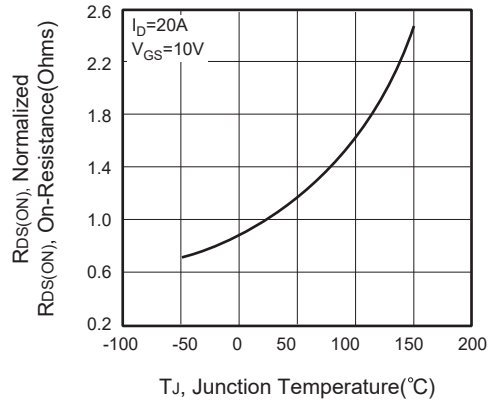


Figure 4. On-Resistance Variation with Temperature



Figure 5. Gate Threshold Variation with Temperature

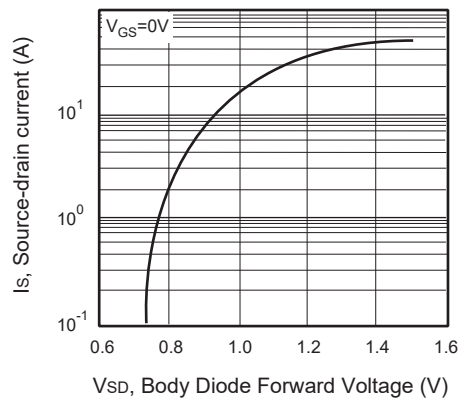


Figure 6. Body Diode Forward Voltage Variation with Source Current

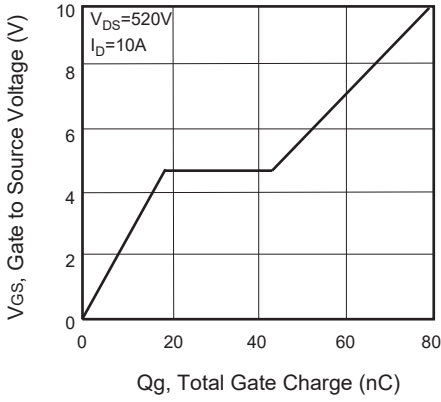


Figure 7. Gate Charge

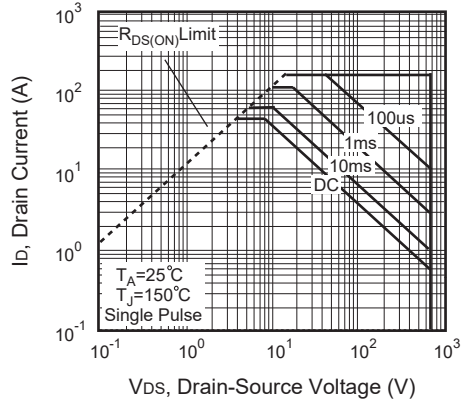


Figure 8. Maximum Safe Operating Area

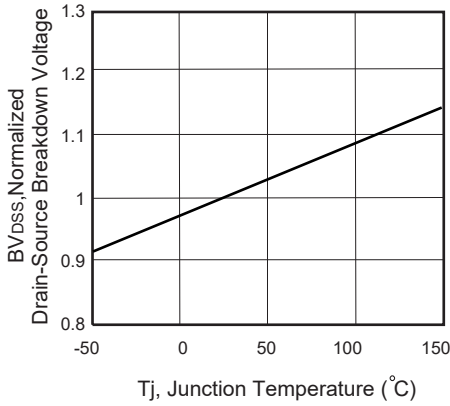


Figure 9. Breakdown Voltage Variation VS Temperature

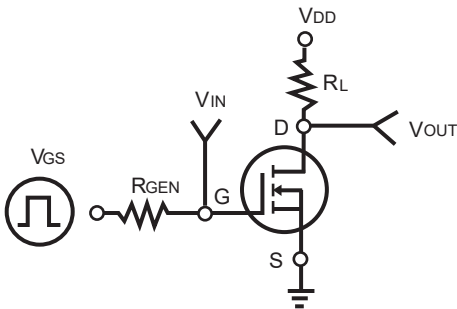


Figure 10. Switching Test Circuit



Figure 11. Switching Waveforms

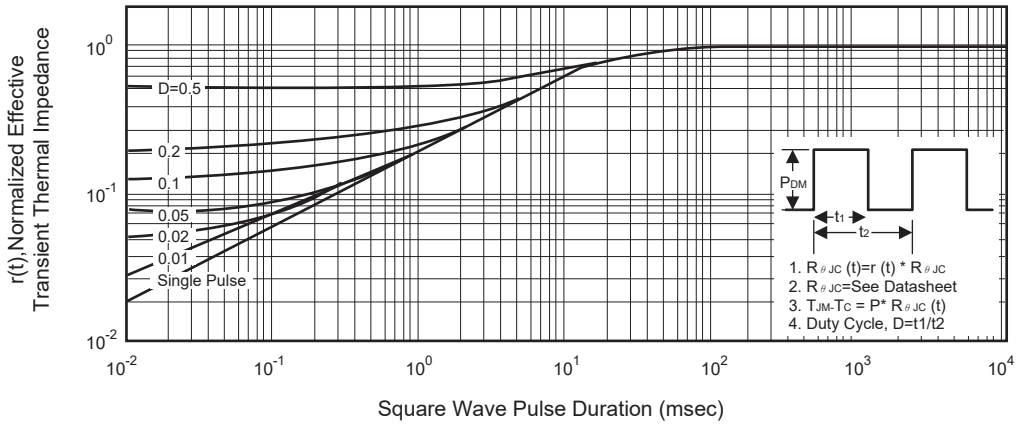


Figure 12. Normalized Thermal Transient Impedance Curve