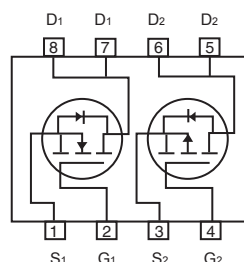
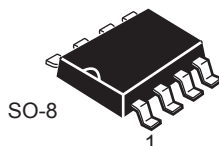


Dual Enhancement Mode Field Effect Transistor (N and P Channel)

FEATURES

- 60V, 4.5A, $R_{DS(ON)} = 55m\Omega$ @ $V_{GS} = 10V$.
 $R_{DS(ON)} = 72m\Omega$ @ $V_{GS} = 4.5V$.
- -60V, -3.7A, $R_{DS(ON)} = 80m\Omega$ @ $V_{GS} = -10V$.
 $R_{DS(ON)} = 100m\Omega$ @ $V_{GS} = -4.5V$.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handing capability.
- RoHS compliant.
- Surface mount Package.



ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current-Continuous	I_D	4.5	-3.7	A
Drain Current-Pulsed ^a	I_{DM}	18	-14.8	A
Maximum Power Dissipation	P_D	2.0		W
Operating and Store Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

Thermal Characteristics

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

N-Channel Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 20V, V_{DS} = 0V$			100	μA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -20V, V_{DS} = 0V$			-100	μA
On Characteristics ^c						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1		3	V
Static Drain-Source	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 4.5A$		44	55	m Ω
On-Resistance		$V_{GS} = 4.5V, I_D = 4A$		52.5	72	m Ω
Dynamic Characteristics ^d						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$		560		pF
Output Capacitance	C_{oss}			70		pF
Reverse Transfer Capacitance	C_{rss}			40		pF
Switching Characteristics ^d						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 1A, V_{GS} = 10V, R_{GEN} = 6\Omega$		11		ns
Turn-On Rise Time	t_r			3		ns
Turn-Off Delay Time	$t_{d(off)}$			28		ns
Turn-Off Fall Time	t_f			3		ns
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 3A, V_{GS} = 10V$		13		nC
Gate-Source Charge	Q_{gs}			1		nC
Gate-Drain Charge	Q_{gd}			4		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current ^b	I_S				1	A
Drain-Source Diode Forward Voltage ^c	V_{SD}	$V_{GS} = 0V, I_S = 1.5A$			1.2	V
Notes : a.Repetitive Rating : Pulse width limited by maximum junction temperature. b.Surface Mounted on FR4 Board, $t \leq 10\text{ sec.}$ c.Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$. d.Guaranteed by design, not subject to production testing.						

P-Channel Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60V, V_{GS} = 0V$			-1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 20V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -20V, V_{DS} = 0V$			-100	nA
On Characteristics ^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-1		-3	V
Static Drain-Source	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -3.5A$		64	80	m Ω
On-Resistance		$V_{GS} = -4.5V, I_D = -3.1A$		76	100	m Ω
Dynamic Characteristics ^c						
Input Capacitance	C_{iss}	$V_{DS} = -30V, V_{GS} = 0V, f = 1.0\text{ MHz}$		990		pF
Output Capacitance	C_{oss}			110		pF
Reverse Transfer Capacitance	C_{rss}			60		pF
Switching Characteristics ^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30V, I_D = -1A, V_{GS} = -10V, R_{GEN} = 6\Omega$		13		ns
Turn-On Rise Time	t_r			4		ns
Turn-Off Delay Time	$t_{d(off)}$			42		ns
Turn-Off Fall Time	t_f			4		ns
Total Gate Charge	Q_g	$V_{DS} = -30V, I_D = -3.5A, V_{GS} = -10V$		21		nC
Gate-Source Charge	Q_{gs}			3		nC
Gate-Drain Charge	Q_{gd}			5		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S				-1	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = -1.5A$			-1.2	V
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.						

N-CHANNEL

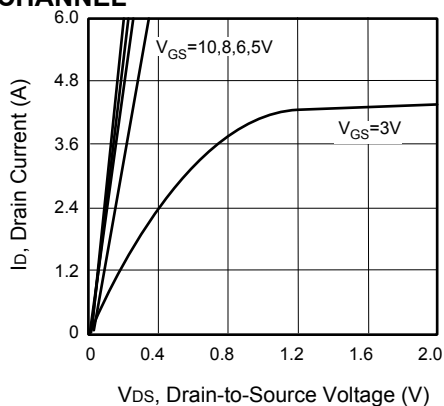


Figure 1. Output Characteristics

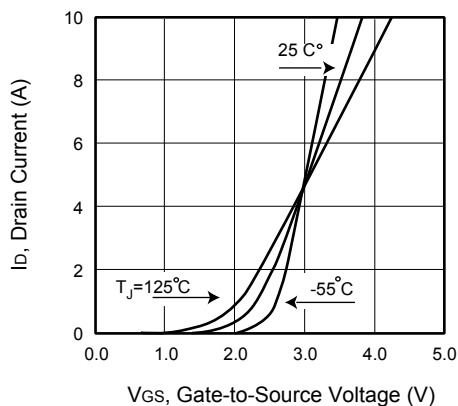


Figure 2. Transfer Characteristics

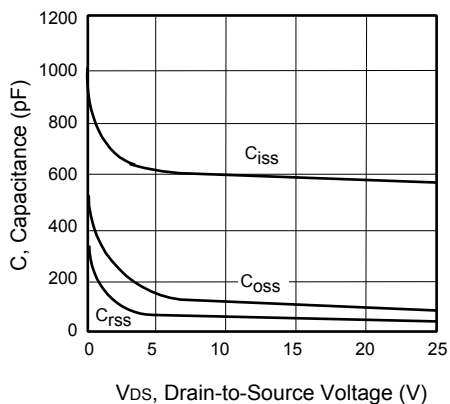


Figure 3. Capacitance

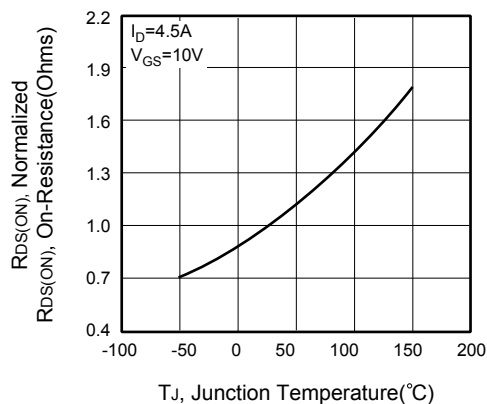


Figure 4. On-Resistance Variation with Temperature

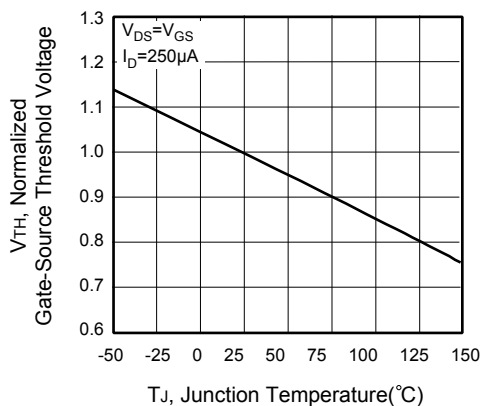


Figure 5. Gate Threshold Variation with Temperature

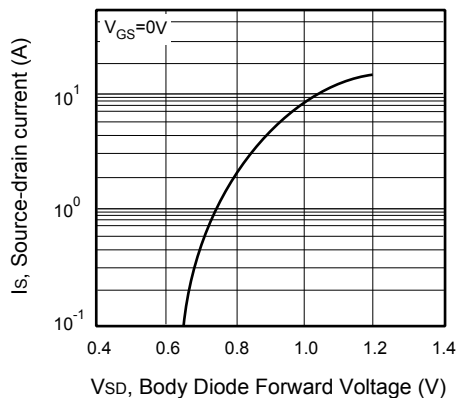


Figure 6. Body Diode Forward Voltage Variation with Source Current

P-CHANNEL

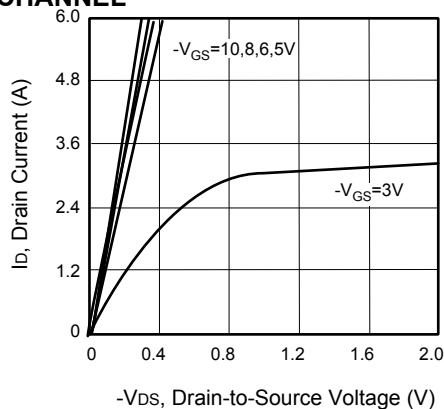


Figure 7. Output Characteristics

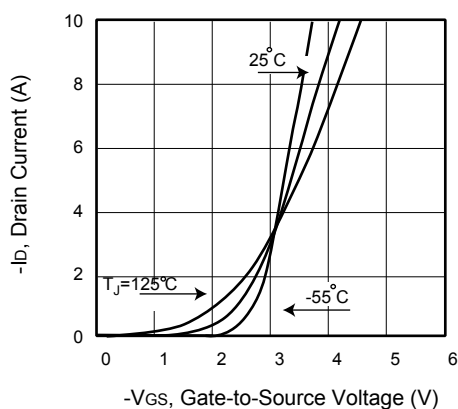


Figure 8. Transfer Characteristics

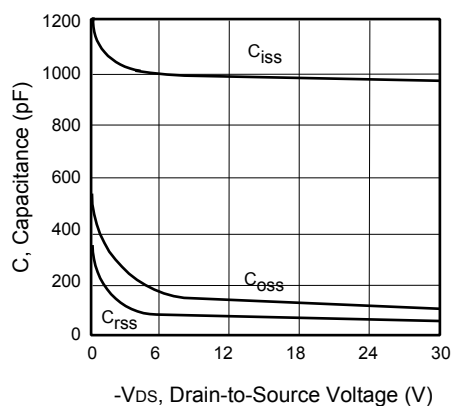


Figure 9. Capacitance

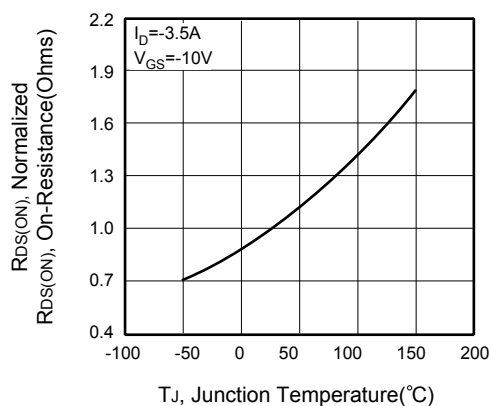


Figure 10. On-Resistance Variation with Temperature

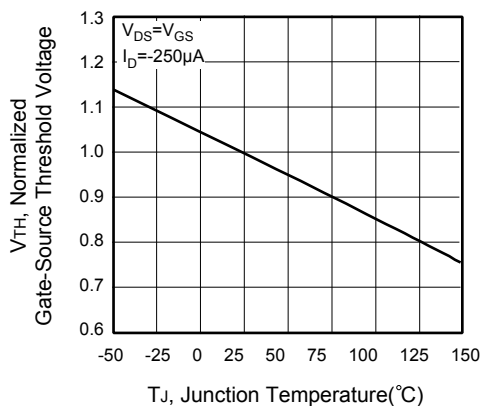


Figure 11. Gate Threshold Variation with Temperature

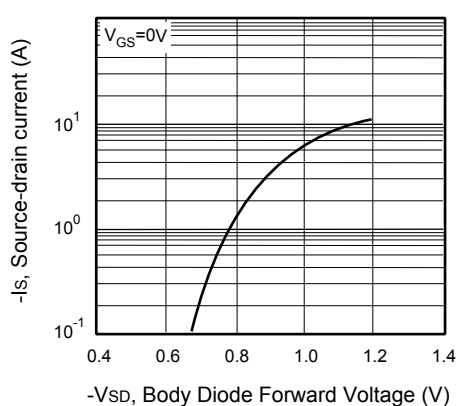


Figure 12. Body Diode Forward Voltage Variation with Source Current

N-CHANNEL

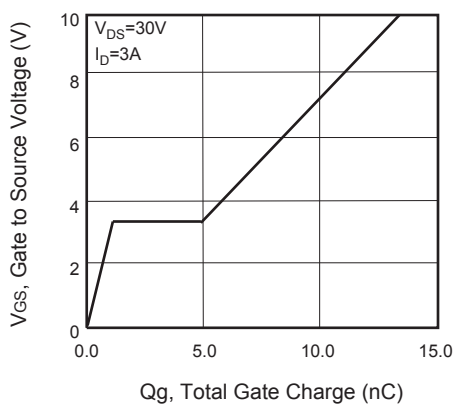


Figure 13. Gate Charge

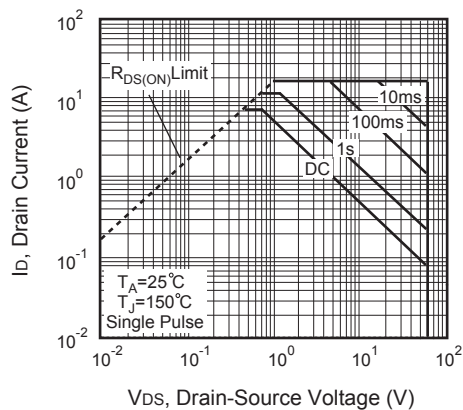


Figure 14. Maximum Safe Operating Area

P-CHANNEL

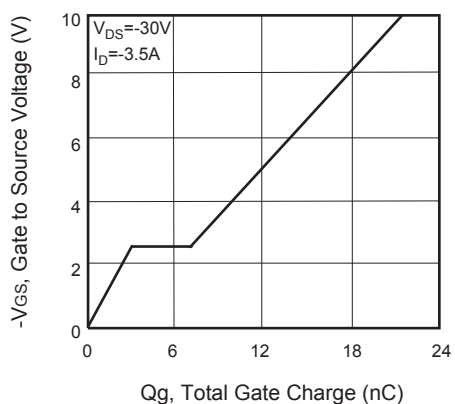


Figure 15. Gate Charge

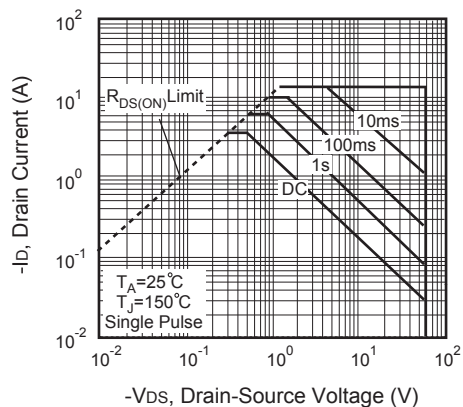


Figure 16. Maximum Safe Operating Area

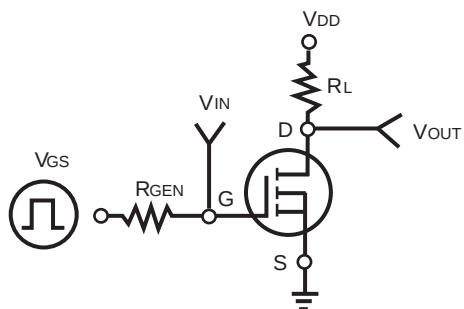


Figure 17. Switching Test Circuit

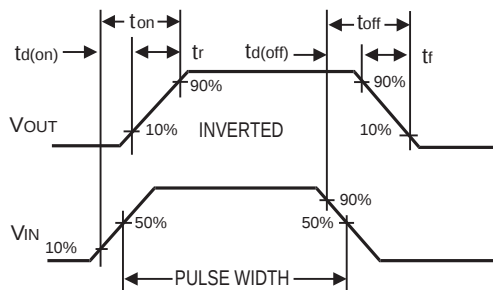


Figure 18. Switching Waveforms

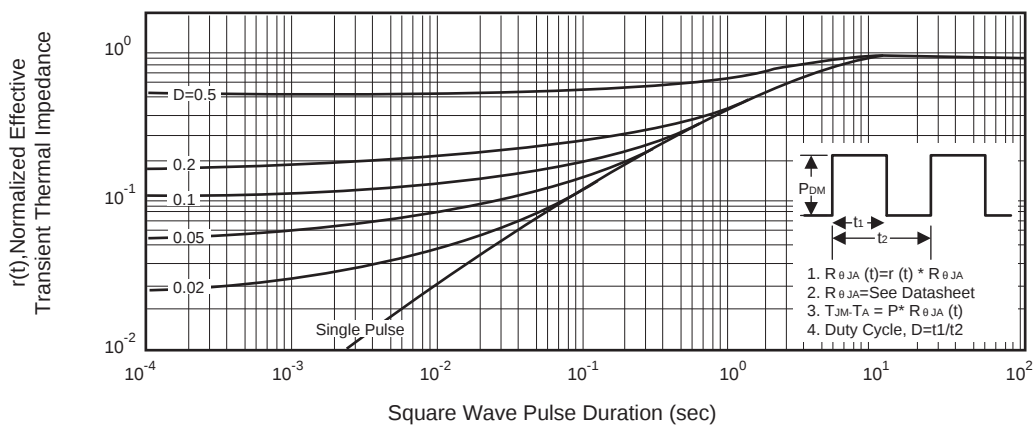


Figure 19. Normalized Thermal Transient Impedance Curve