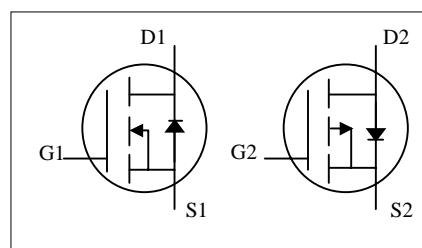
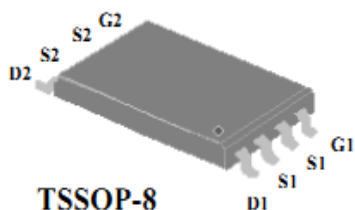


## N- and P-Channel 60-V (D-S) MOSFET

- ▼ Simple Drive Requirement
- ▼ Lower Gate Charge
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

N-CH	$BV_{DSS}$	30V
	$R_{DS(ON)}$	22m $\Omega$
	$I_D$	6.2A
P-CH	$BV_{DSS}$	-30V
	$R_{DS(ON)}$	45m $\Omega$
	$I_D$	-5.0A



### Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
$V_{DS}$	Drain-Source Voltage	30	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D@T_A=25^\circ C$	Continuous Drain Current <sup>3</sup>	6.2	-5.0	A
$I_D@T_A=70^\circ C$	Continuous Drain Current <sup>3</sup>	5.0	-4.0	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	20	-18	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	1.35		W
$T_{STG}$	Storage Temperature Range	-55 to 150		$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150		$^\circ C$

### Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	90	$^\circ C/W$

**N-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=6A$	-	23	-	m $\Omega$
		$V_{GS}=4.5V, I_D=4A$	-	30	-	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=6A$	-	14	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge	$I_D=6A$	-	7	11	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=15V$	-	2	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=15V$	-	6	-	ns
$t_r$	Rise Time	$I_D=1A$	-	6	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	17	-	ns
$t_f$	Fall Time	$V_{GS}=10V$	-	4	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	550	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=15V$	-	105	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	90	-	pF
$R_g$	Gate Resistance	$f=1.0\text{MHz}$	-	1.7	-	$\Omega$

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=1.2A, V_{GS}=0V$	-	-	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_S=6A, V_{GS}=0V,$	-	15	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	7	-	nC

**P-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-5A$	-	45	-	m $\Omega$
		$V_{GS}=-4.5V, I_D=-3A$	-	66	-	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-	-3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-5A$	-	18	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge	$I_D=-5A$	-	14.4	23	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=-15V$	-	5.5	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	5	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=-15V$	-	7	-	ns
$t_r$	Rise Time	$I_D=-1A$	-	6.5	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	36	-	ns
$t_f$	Fall Time	$V_{GS}=-10V$	-	28	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	960	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=-15V$	-	190	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	170	-	pF
$R_g$	Gate Resistance	$f=1.0\text{MHz}$	-	6	-	$\Omega$

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=-1.2A, V_{GS}=0V$	-	-	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_S=-5A, V_{GS}=0V,$	-	19	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	9	-	nC

**Notes:**

1. Pulse width limited by Max. junction temperature.
2. Pulse test
3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board,  $t \leq 10\text{sec}$ ;  $208^\circ\text{C}/W$  when mounted on min. copper pad.

N-Channel

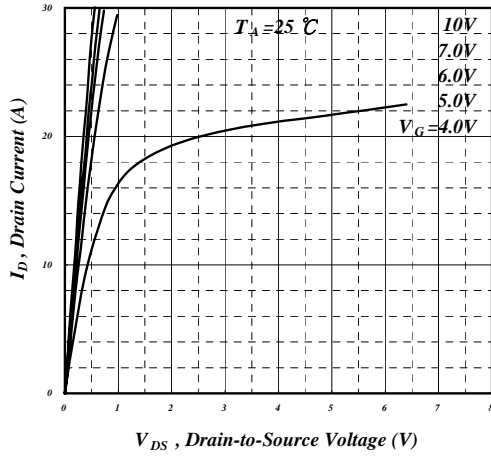


Fig 1. Typical Output Characteristics

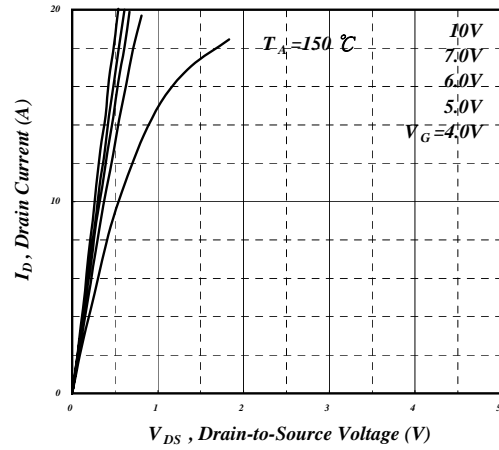


Fig 2. Typical Output Characteristics

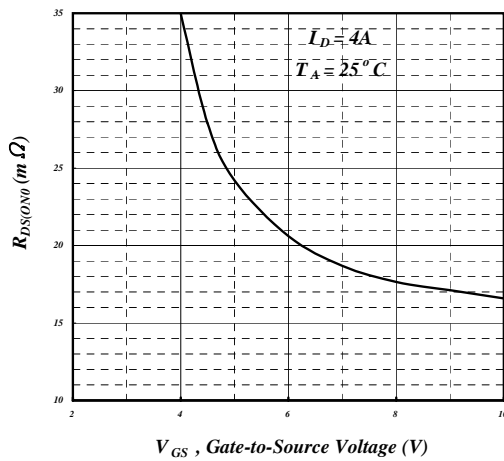


Fig 3. On-Resistance v.s. Gate Voltage

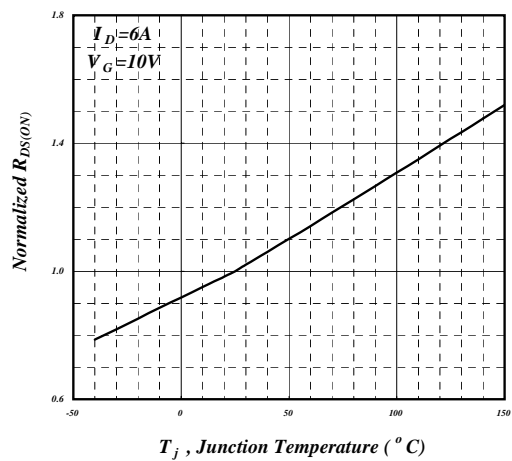


Fig 4. Normalized On-Resistance v.s. Junction Temperature

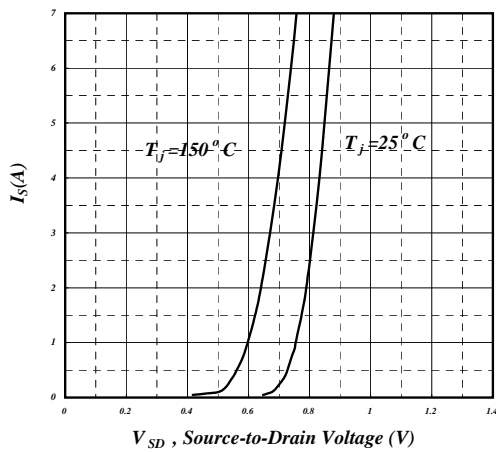


Fig 5. Forward Characteristic of Reverse Diode

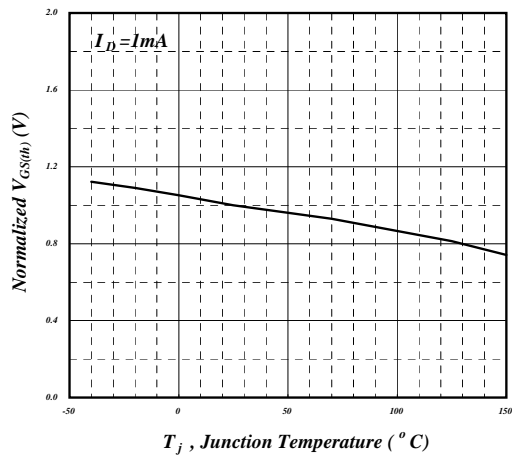
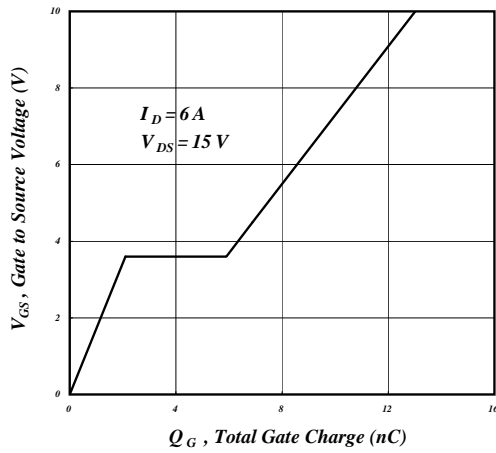
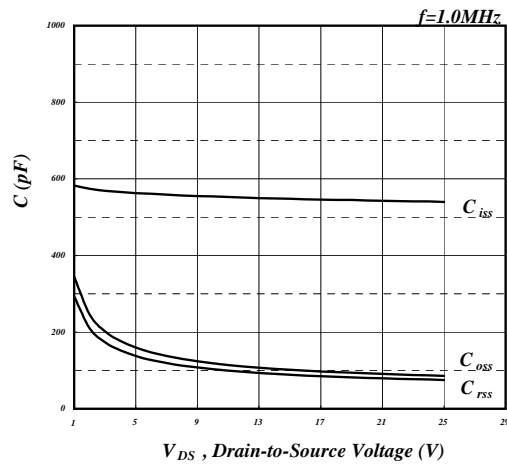


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

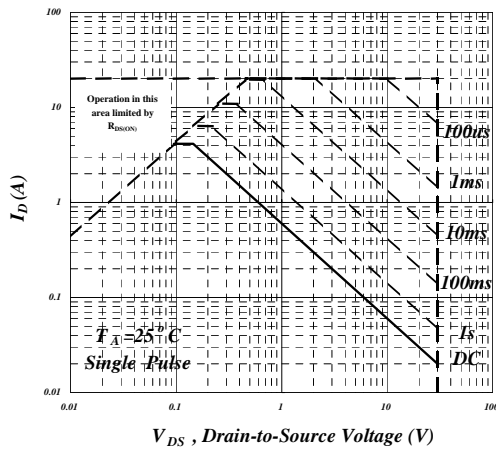
**N-Channel**



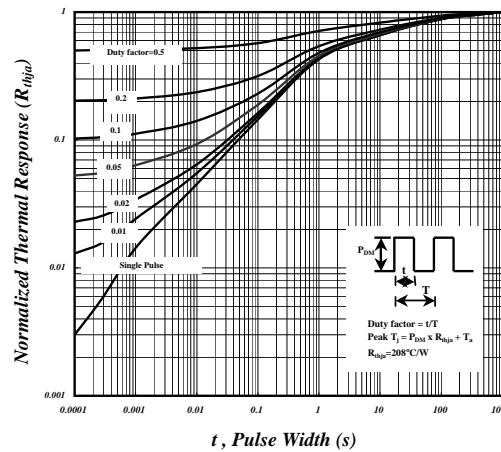
**Fig 7. Gate Charge Characteristics**



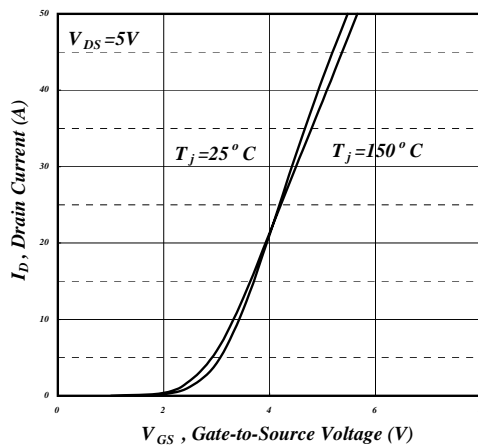
**Fig 8. Typical Capacitance Characteristics**



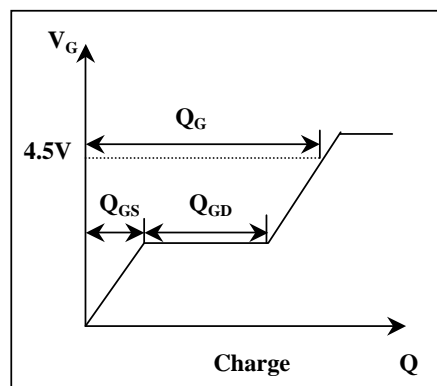
**Fig 9. Maximum Safe Operating Area**



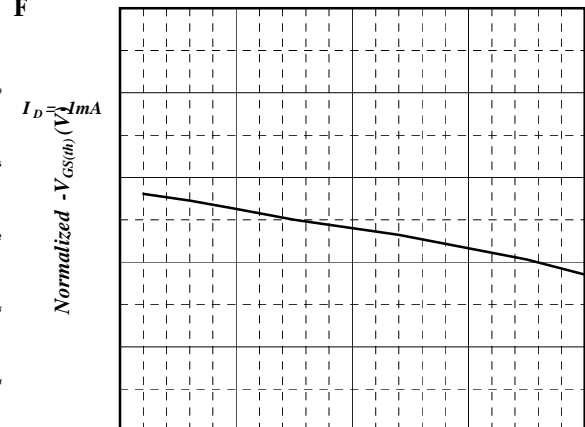
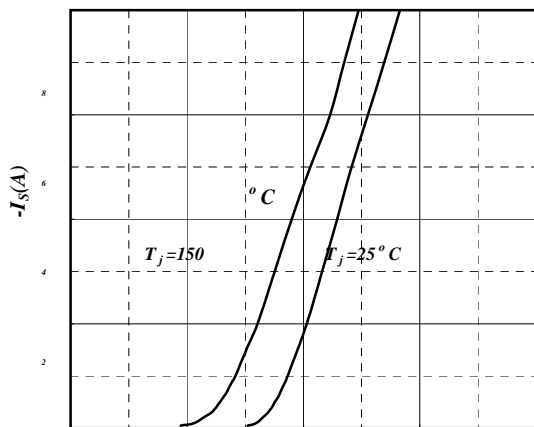
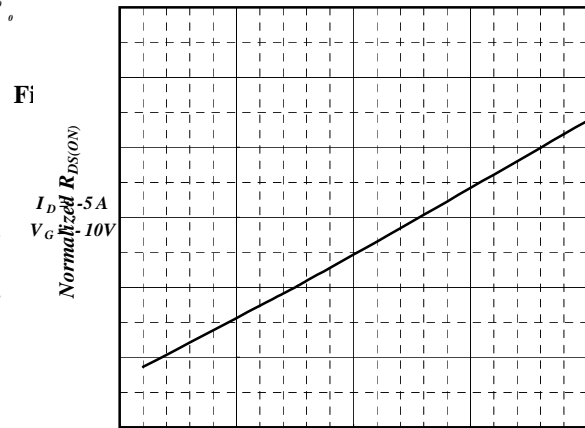
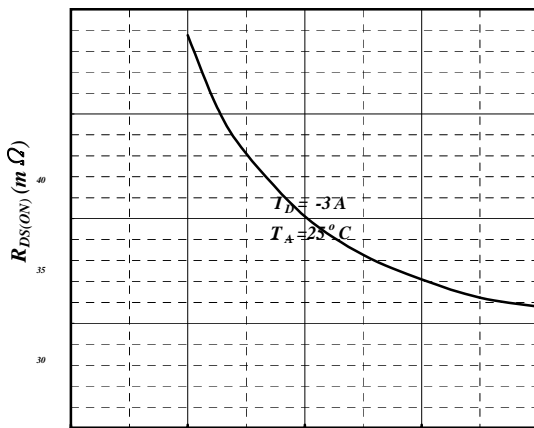
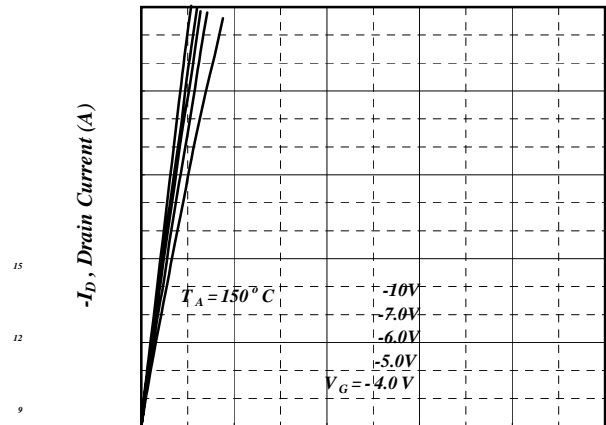
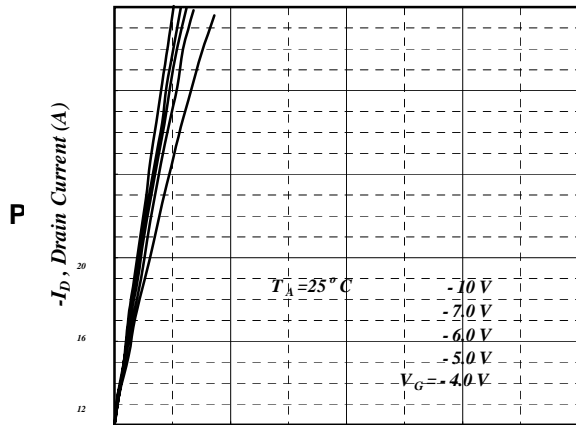
**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Transfer Characteristics**



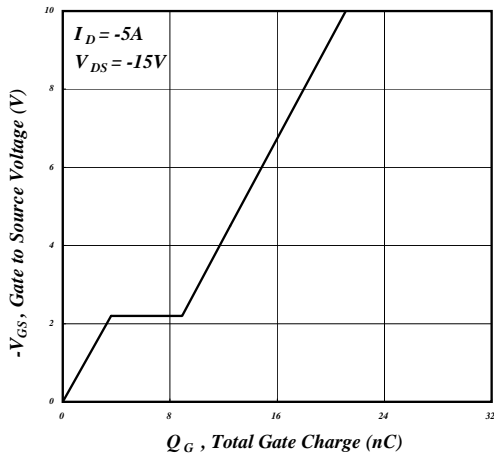
**Fig 12. Gate Charge Waveform**



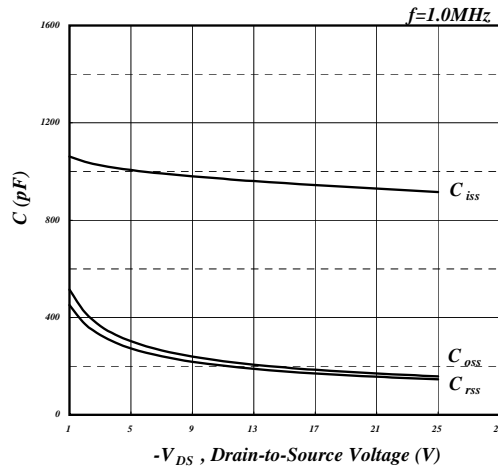
**Fig 5. Forward Characteristic of Reverse Diode**

**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

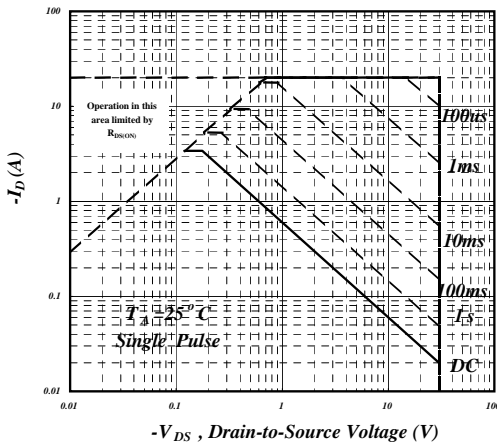
**P-Channel**



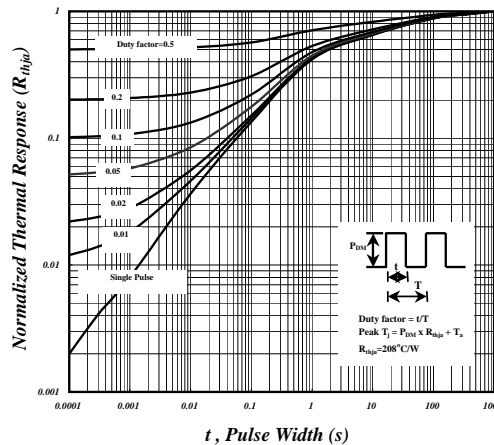
**Fig 7. Gate Charge Characteristics**



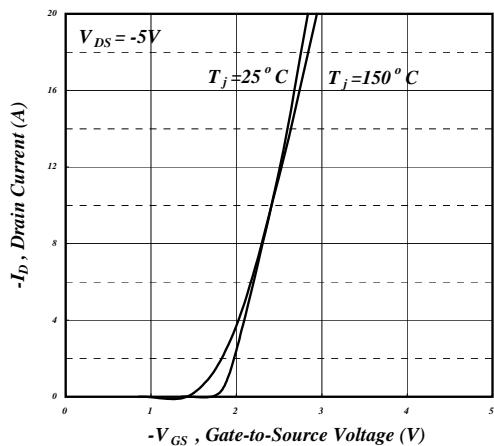
**Fig 8. Typical Capacitance Characteristics**



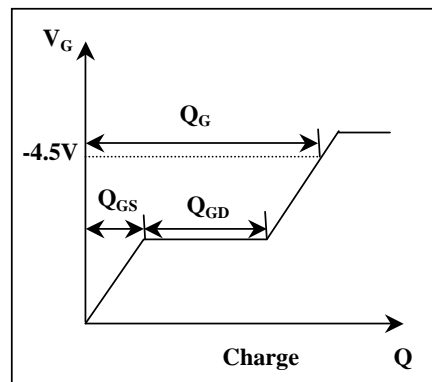
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



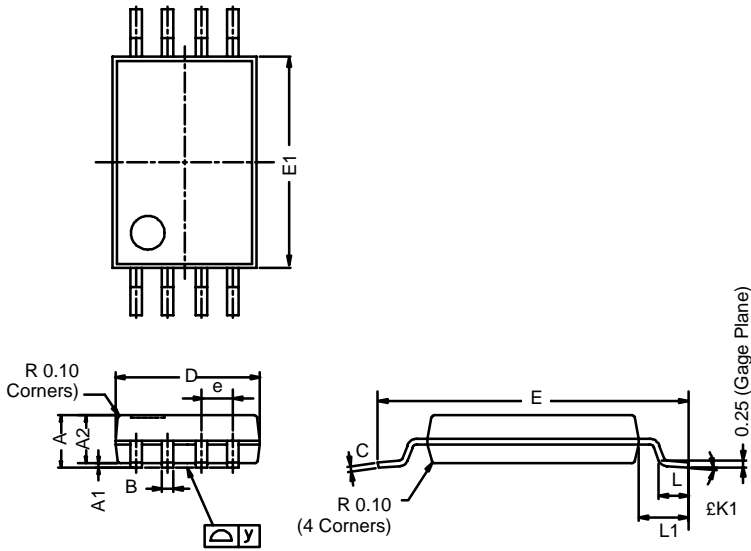
**Fig 11. Transfer Characteristics**



**Fig 12. Gate Charge Waveform**

**TSSOP: 8-LEAD**

JEDEC Part Number: MO-153



Dim	MILLIMETERS		
	Min	Nom	Max
A	–	–	1.20
A <sub>1</sub>	0.05	0.10	0.15
A <sub>2</sub>	0.80	1.00	1.05
B	0.19	0.28	0.30
C	–	0.127	–
D	2.90	3.00	3.10
E	6.20	6.40	6.60
E <sub>1</sub>	4.30	4.40	4.50
e	–	0.65	–
L	0.45	0.60	0.75
L <sub>1</sub>	0.90	1.00	1.10
Y	–	–	0.10
£K1	0°	3°	6°

ECN: S-03946—Rev. G, 09-Jul-01  
DWG: 5844



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