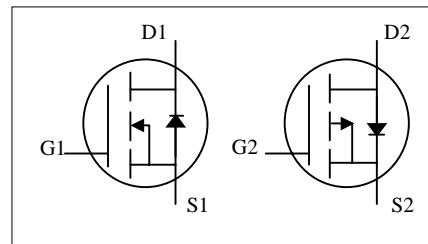
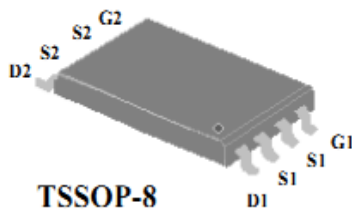


## N- and P-Channel 60-V (D-S) MOSFET

- ▼ 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
$R_{thj-a}$	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	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	+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

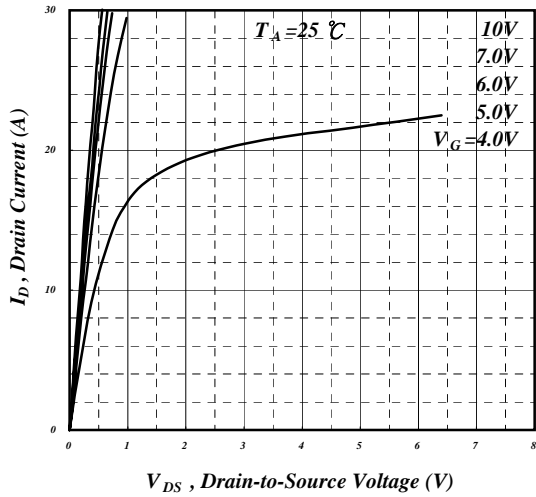


Fig 1. Typical Output Characteristics

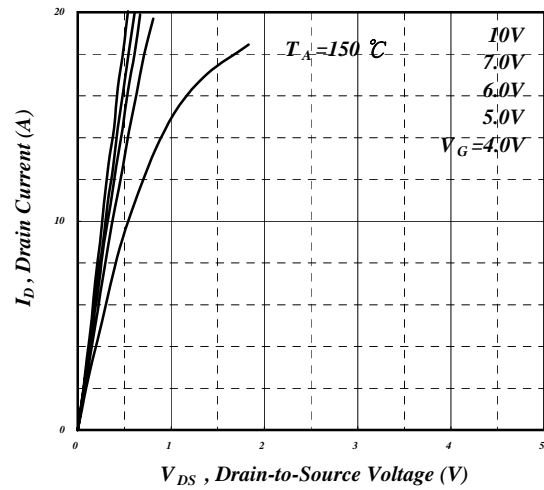


Fig 2. Typical Output Characteristics

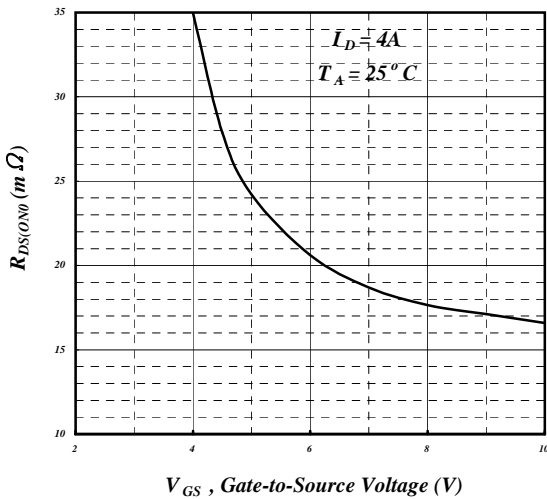


Fig 3. On-Resistance v.s. Gate Voltage

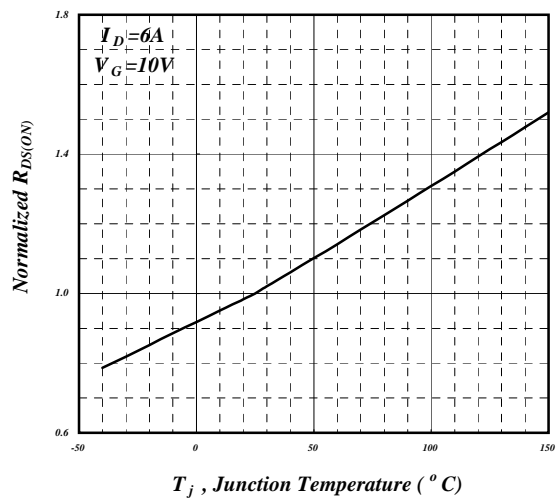


Fig 4. Normalized On-Resistance v.s. Junction Temperature

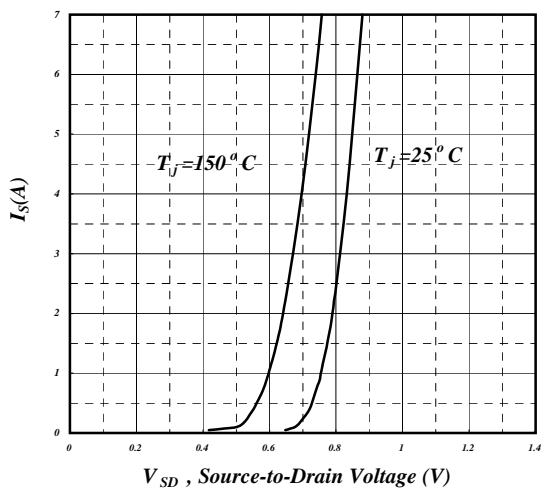


Fig 5. Forward Characteristic of Reverse Diode

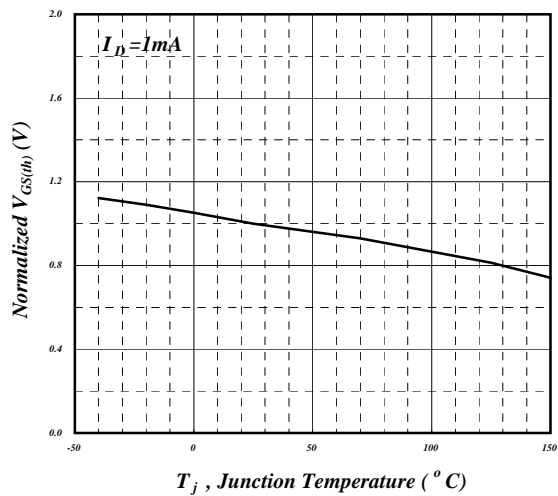
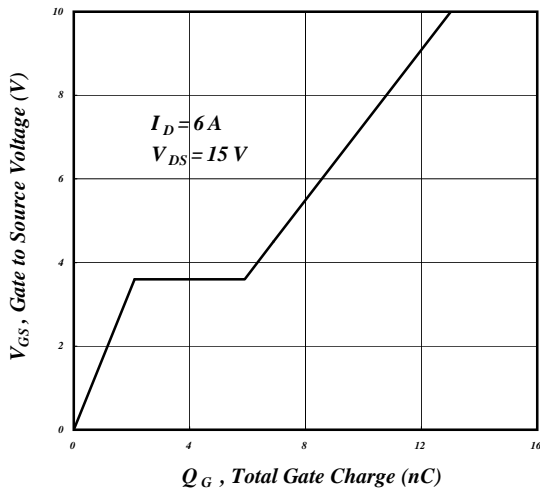
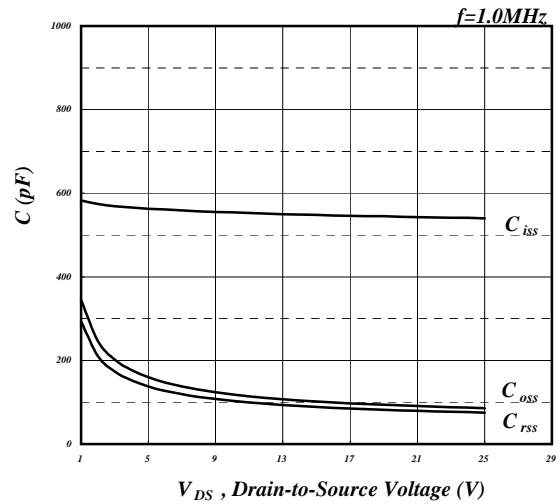


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

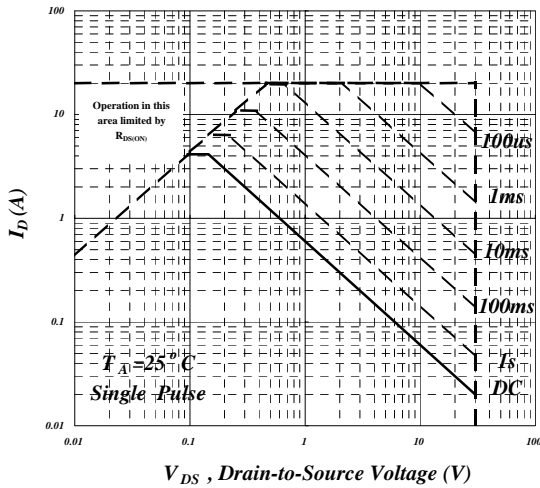
**N-Channel**



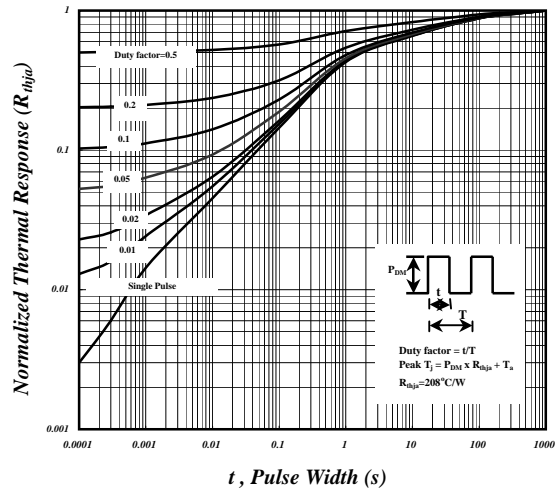
**Fig 7. Gate Charge Characteristics**



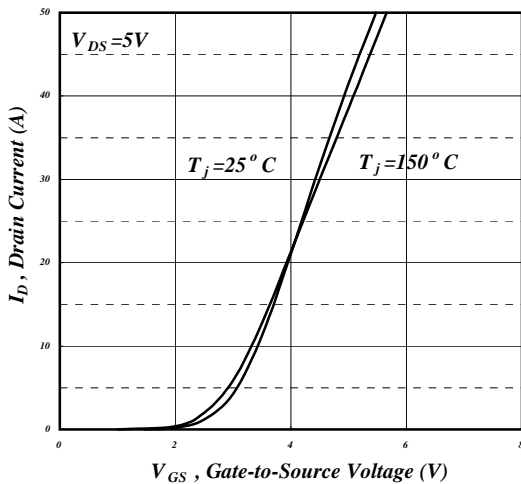
**Fig 8. Typical Capacitance Characteristics**



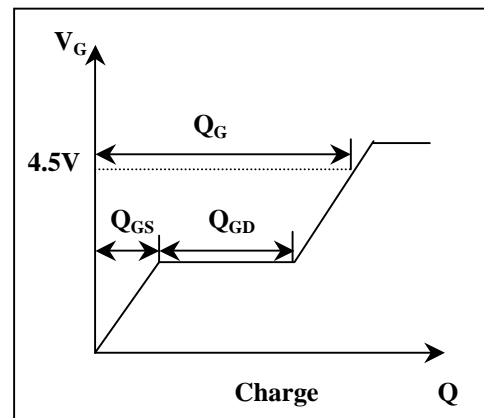
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Transfer Characteristics**



**Fig 12. Gate Charge Waveform**

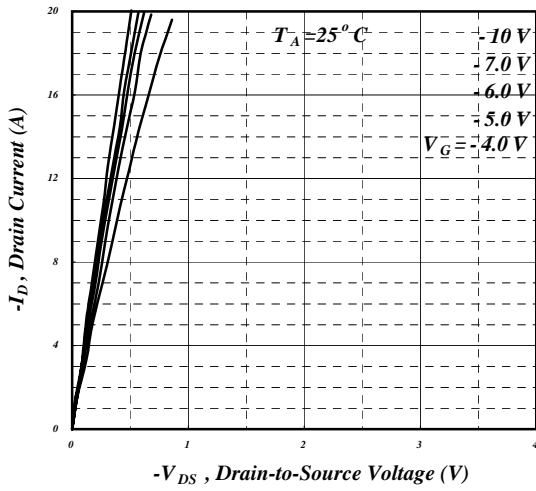


Fig 1. Typical Output Characteristics

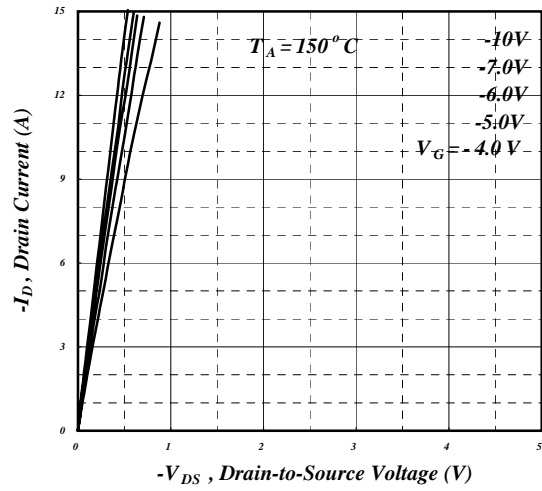


Fig 2. Typical Output Characteristics

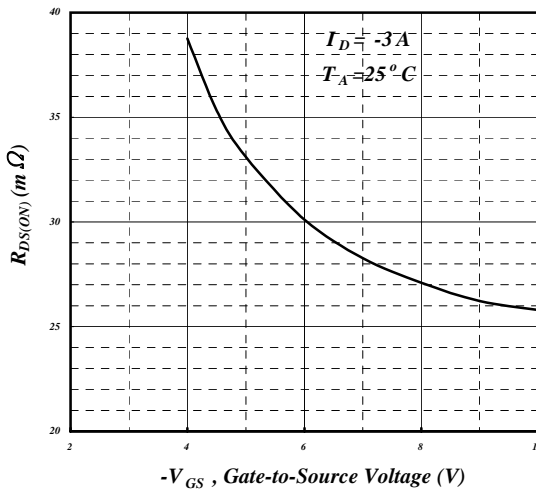


Fig 3. On-Resistance v.s. Gate Voltage

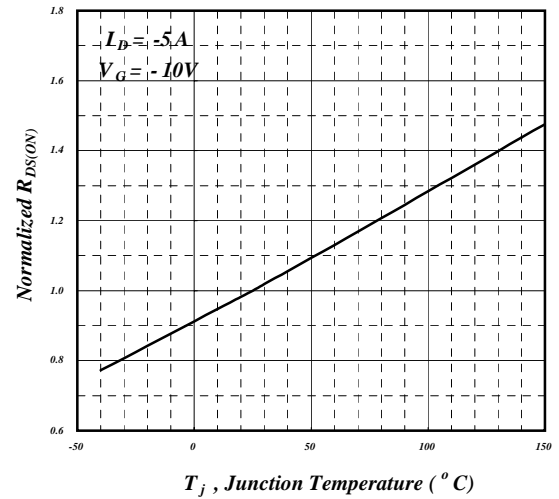


Fig 4. Normalized On-Resistance v.s. Junction Temperature

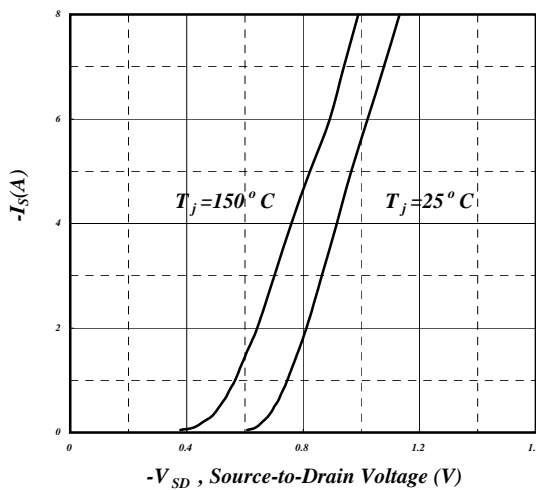


Fig 5. Forward Characteristic of Reverse Diode

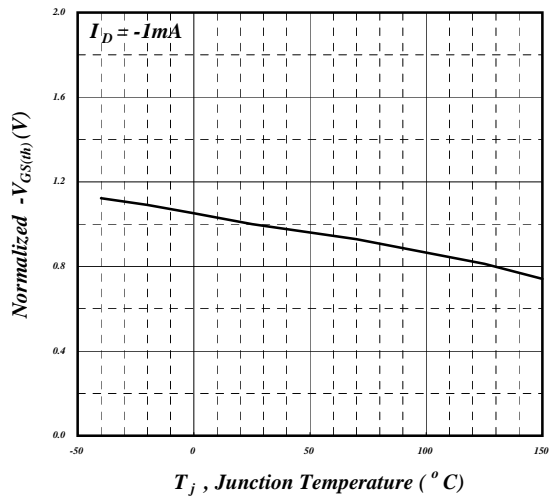


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

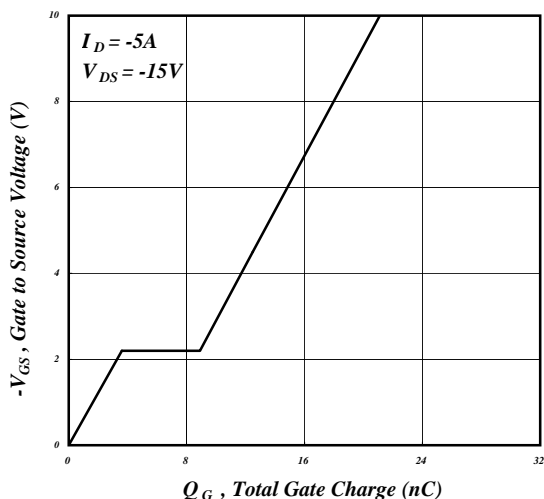


Fig 7. Gate Charge Characteristics

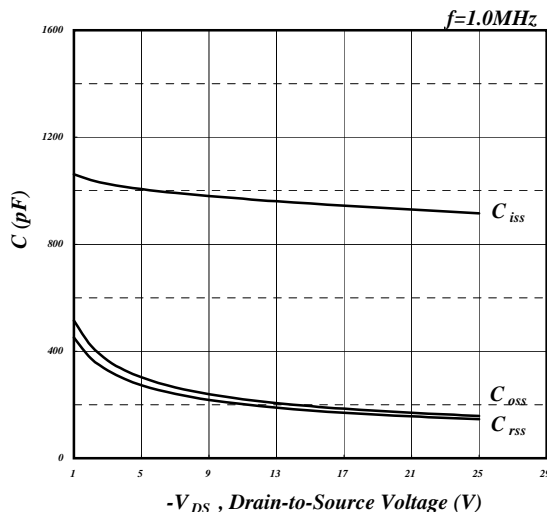


Fig 8. Typical Capacitance Characteristics

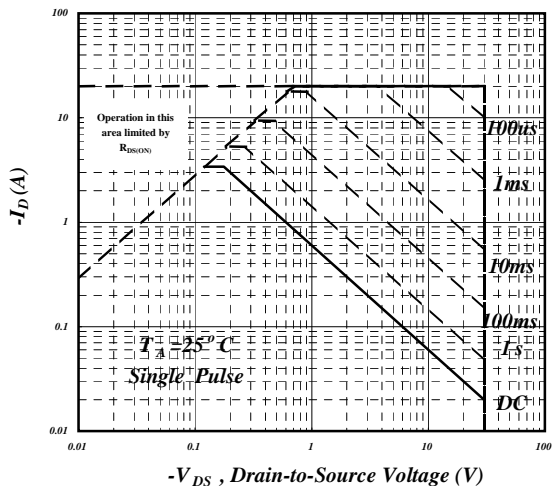


Fig 9. Maximum Safe Operating Area

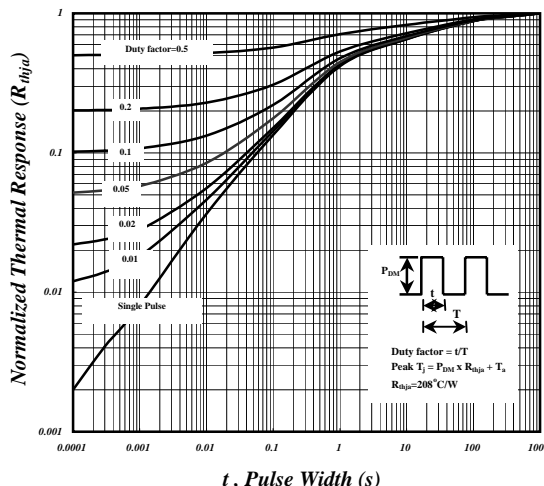


Fig 10. Effective Transient Thermal Impedance

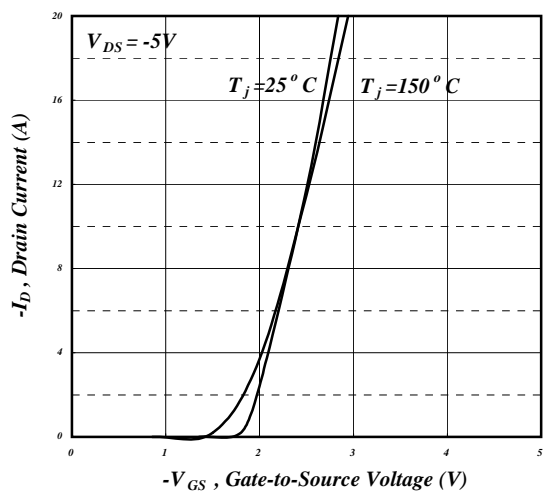


Fig 11. Transfer Characteristics

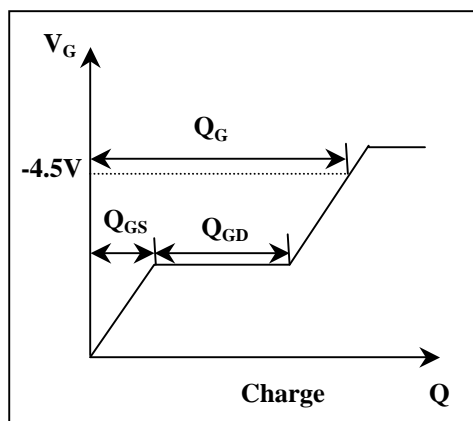
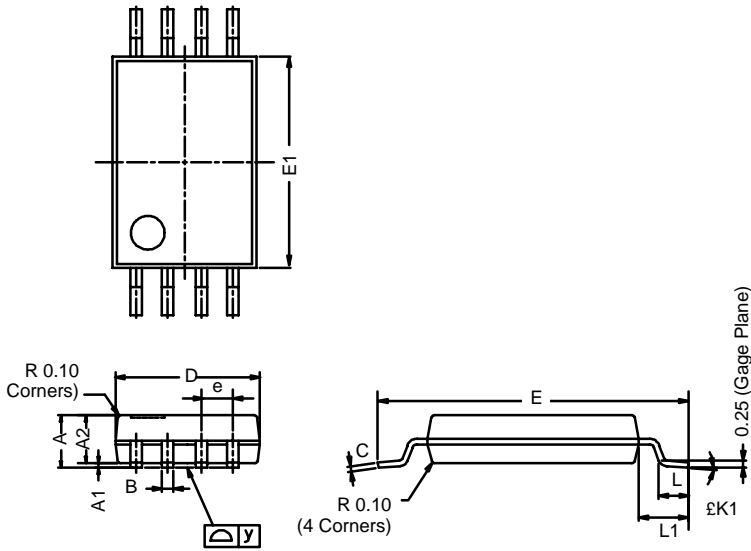


Fig 12. Gate Charge Waveform

**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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