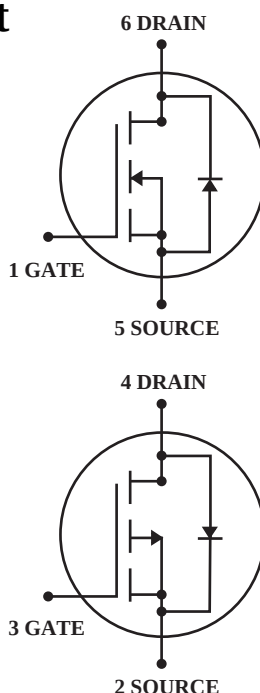


N AND P-Channel Enhancement Mode POWER MOSFET

(Pb) Lead(Pb)-Free

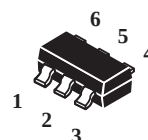
Features:

- * Low Gate charge
- * Low On-Resistance
- N-CH $R_{DS(ON)} < 75m\Omega @ V_{GS} = 4.5V$
- P-CH $R_{DS(ON)} < 160m\Omega @ V_{GS} = -4.5V$
- * SOT-8 Package



N-CHANNEL
DRAIN SOURCE VOLTAGE
20 VOLTAGE
DRAIN CURRENT
3.5 AMPERES

P-CHANNEL
DRAIN SOURCE VOLTAGE
-20 VOLTAGE
DRAIN CURRENT
-2.5 AMPERES



TSOP-6

Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Specified)

Rating	Symbol	Value		Unit
		N-Channl	P-Channl	
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 12	± 12	V
Continuous Drain Current ³ $T_A = 25^\circ C$ $T_A = 75^\circ C$	I_D	3.5 2.8	-2.5 -1.97	A
Pulsed Drain Current ¹	I_{DM}	10	-10	A
Total Power Dissipation $T_A = 25^\circ C$	P_D	1.14		W
Maximum Junction-ambient ³	$R_{\theta JA}$	110		$^\circ C/W$
Operating Junction Temperature Range	T_J	+150		$^\circ C$
Storage Temperature Range	T_{stg}	-55~+150		$^\circ C$

Device Marking

WTV3585=3585

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF Characteristics

Drain-Source Breakdown Voltage $V_{GS}=0, I_D=250\mu\text{A}$	BV_{DSS}	20	-	-	V
Drain-Source Leakage Current $T_J=25^\circ\text{C}, V_{DS}=20\text{V}, V_{GS}=0\text{V}$ $T_J=70^\circ\text{C}, V_{DS}=16\text{V}, V_{GS}=0\text{V}$	I_{DSS}	-	-	1 10	μA
Gate-Source Leakage current $V_{GS}=\pm 12\text{V}$	I_{GSS}	-	-	± 100	nA

ON Characteristics

Gate-Source Threshold Voltage $V_{DS}=V_{GS}, I_D=250\mu\text{A}$	$V_{GS(Th)}$	0.5	-	1.2	V
Drain-Source On-Resistance $V_{GS}=4.5\text{V}, I_D=3.5\text{A}$ $V_{GS}=2.5\text{V}, I_D=1.2\text{A}$	$R_{DS(on)}$	-	-	75 125	m Ω
Forward Transconductance $V_{DS}=5\text{V}, I_D=3\text{A}$	g_{fs}	-	7	-	S

Dynamic Characteristics

Input Capacitance $V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1.0\text{MHz}$	C_{iss}	-	230	370	pF
Output Capacitance $V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1.0\text{MHz}$	C_{oss}	-	55	-	
Reverse Transfer Capacitance $V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1.0\text{MHz}$	C_{rss}	-	40	-	
Gate Resistance $f=1.0\text{MHz}$	R_g	-	1.1	1.7	Ω

Switching Characteristics

Turn-on Delay Time $V_{DS}=15\text{V}, V_{GS}=5\text{V}, I_D=1\text{A}, R_G=3.3\Omega, R_D=15\Omega$	$t_{d(on)}$	-	6	-	ns
Rise Time $V_{DS}=15\text{V}, V_{GS}=5\text{V}, I_D=1\text{A}, R_G=3.3\Omega, R_D=15\Omega$	t_r	-	8	-	
Turn-off Delay Time $V_{DS}=15\text{V}, V_{GS}=5\text{V}, I_D=1\text{A}, R_G=3.3\Omega, R_D=15\Omega$	$t_{d(off)}$	-	10	-	
Fall Time $V_{DS}=15\text{V}, V_{GS}=5\text{V}, I_D=1\text{A}, R_G=3.3\Omega, R_D=15\Omega$	t_f	-	3	-	
Total Gate Charge $V_{DS}=16\text{V}, V_{GS}=4.5\text{V}, I_D=3\text{A}$	Q_g	-	4	7	nC
Gate-Source Charge $V_{DS}=16\text{V}, V_{GS}=4.5\text{V}, I_D=3\text{A}$	Q_{gs}	-	0.7	-	
Gate-Source Change $V_{DS}=16\text{V}, V_{GS}=4.5\text{V}, I_D=3\text{A}$	Q_{gd}	-	2	-	

Source-Drain Diode Characteristics

Forward On Voltage $I_S=1.2\text{A}, V_{GS}=0\text{V}$	V_{SD}	-	-	1.2	V
Reverse Recovery Time $I_S=3\text{A}, V_{GS}=0\text{V}, dI/dt=100\text{A}/\mu\text{s}$	T_{rr}	-	16	-	nS
Reverse Recovery Charge $I_S=3\text{A}, V_{GS}=0\text{V}, dI/dt=100\text{A}/\mu\text{s}$	Q_{rr}	-	8	-	nC

Note: 1. Pulse width limited by Max. junction temperature.

2. Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 5\text{sec}$; $180^\circ\text{C}/\text{W}$ when mounted on Min. copper pad.

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF Characteristics

Drain-Source Breakdown Voltage $V_{GS}=0V, I_D=-250\mu A$	BV_{DSS}	-20	-	-	V
Drain-Source Leakage Current $T_j=25^\circ\text{C}, V_{DS}=-20V, V_{GS}=0V$ $T_j=70^\circ\text{C}, V_{DS}=-16V, V_{GS}=0V$	I_{DSS}	-	-	-1 -25	μA
Gate-Source Leakage current $V_{GS}=\pm 12V$	I_{GSS}	-	-	± 100	nA

ON Characteristics

Gate-Source Threshold Voltage $V_{DS}=V_{GS}, I_D=-250\mu A$	$V_{GS(Th)}$	-	-	-1.2	V
Drain-Source On-Resistance ² $V_{GS}=-10V, I_D=-2.8A$ $V_{GS}=-4.5V, I_D=-2.5A$ $V_{GS}=-2.5V, I_D=-2A$	$R_{DS(on)}$	-	-	120 160 300	m Ω
Forward Transconductance $V_{DS}=-5V, I_D=-2A$	g_{fs}	-	4.0	-	S

Dynamic Characteristics

Input Capacitance $V_{GS}=0V, V_{DS}=-20V, f=1.0\text{MHz}$	C_{iss}	-	270	430	pF
Output Capacitance $V_{GS}=0V, V_{DS}=-20V, f=1.0\text{MHz}$	C_{oss}	-	70	-	
Reverse Transfer Capacitance $V_{GS}=0V, V_{DS}=-20V, f=1.0\text{MHz}$	C_{rss}	-	55	-	

Switching Characteristics

Turn-on Delay Time $V_{DS}=-10V, V_{GS}=-10V, I_D=-1A, R_G=3.3\Omega, R_D=10\Omega$	$t_{d(on)}$	-	6	-	ns
Rise Time $V_{DS}=-10V, V_{GS}=-10V, I_D=-1A, R_G=3.3\Omega, R_D=10\Omega$	t_r	-	17	-	
Turn-off Delay Time $V_{DS}=-10V, V_{GS}=-10V, I_D=-1A, R_G=3.3\Omega, R_D=10\Omega$	$t_{d(off)}$	-	16	-	
Fall Time $V_{DS}=-10V, V_{GS}=-10V, I_D=-1A, R_G=3.3\Omega, R_D=10\Omega$	t_f	-	5	-	
Total Gate Charge ² $V_{DS}=-16V, V_{GS}=-4.5V, I_D=-2A$	Q_g	-	5	8	nC
Gate-Source Charge $V_{DS}=-16V, V_{GS}=-4.5V, I_D=-2A$	Q_{gs}	-	1	-	
Gate-Source Change $V_{DS}=-16V, V_{GS}=-4.5V, I_D=-2A$	Q_{gd}	-	2	-	

Source-Drain Diode Characteristics

Forward On Voltage ² $I_S=-1.2A, V_{GS}=0V$	V_{SD}	-	-	-1.2	V
Reverse Recovery Time ² $I_S=-2A, V_{GS}=0V, dI/dt=100A/\mu s$	T_{rr}	-	20	-	nS
Reverse Recovery Charge $I_S=-2A, V_{GS}=0V, dI/dt=100A/\mu s$	Q_{rr}	-	15	-	nC

Note: 1. Pulse width limited by Max. junction temperature.

2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

3. Surface mounted on 1 in² copper pad of FR4 board, $t_s \leq 5\text{sec}$; 180°C/W when mounted on Min. copper pad.

Characteristics Curve N-Channel

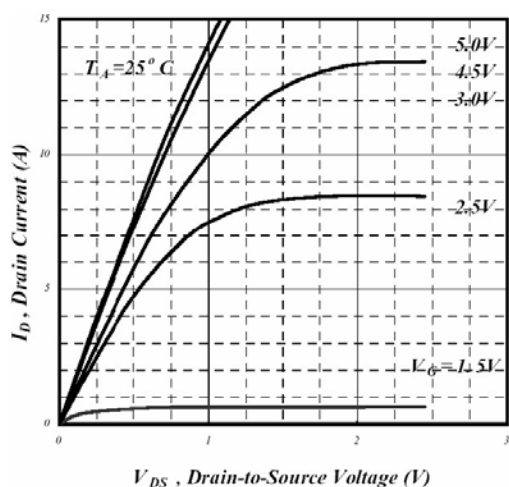


Fig 1. Typical Output Characteristics

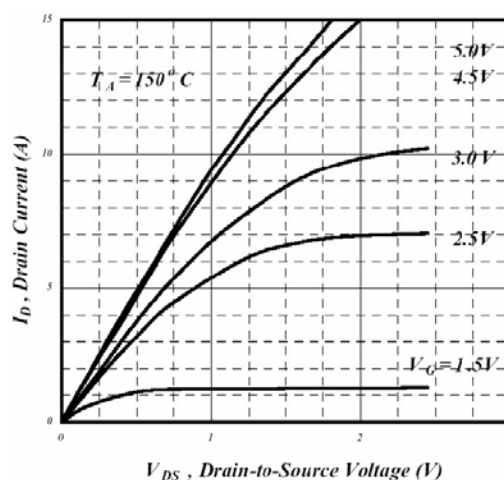


Fig 2. Typical Output Characteristics

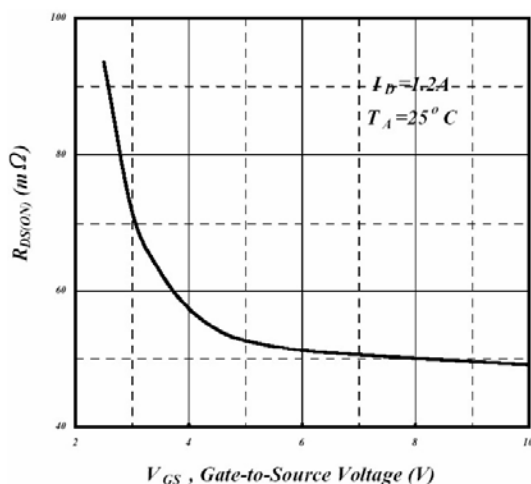


Fig 3. On-Resistance v.s. Gate Voltage

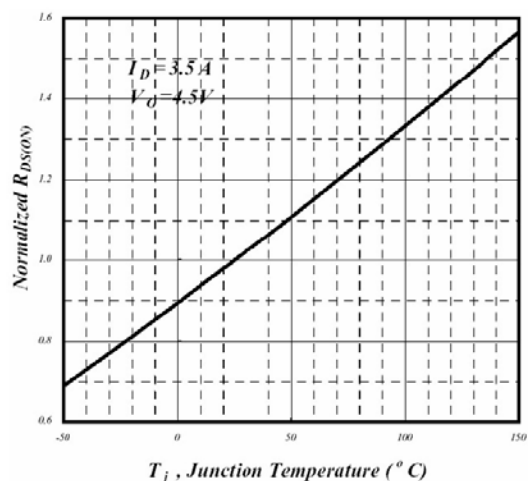


Fig 4. Normalized On-Resistance v.s. Junction Temperature

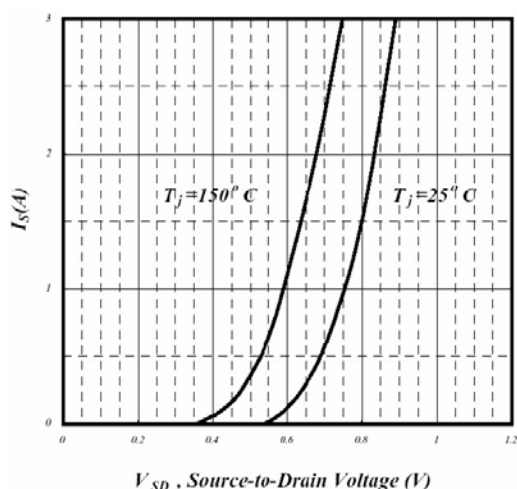


Fig 5. Forward Characteristics of Reverse Diode

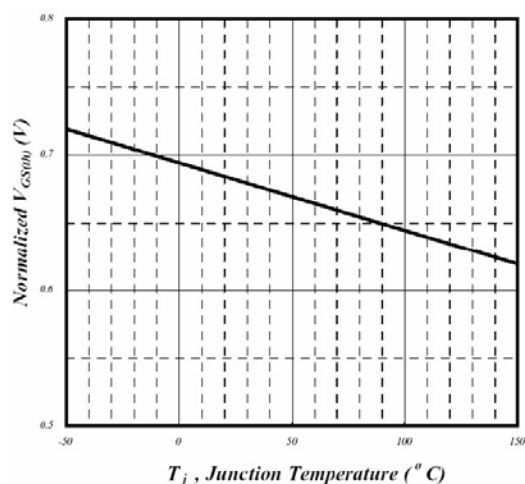


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

N-Channel

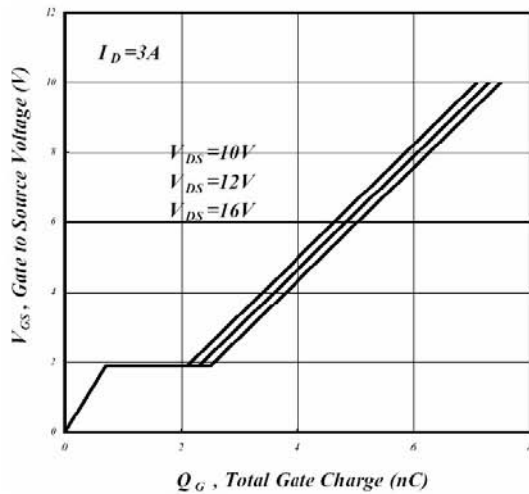


Fig 7. Gate Charge Characteristics

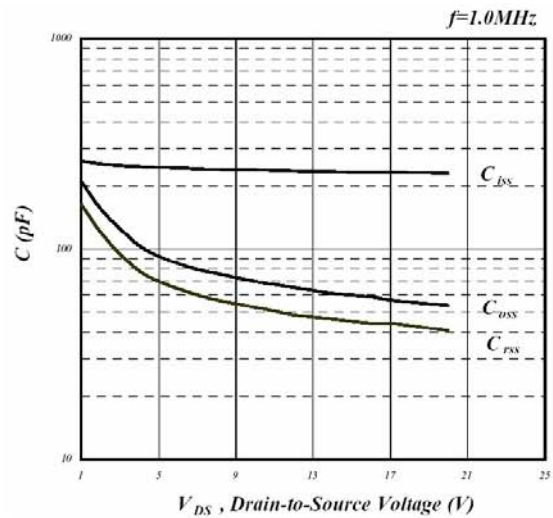


Fig 8. Typical Capacitance Characteristics

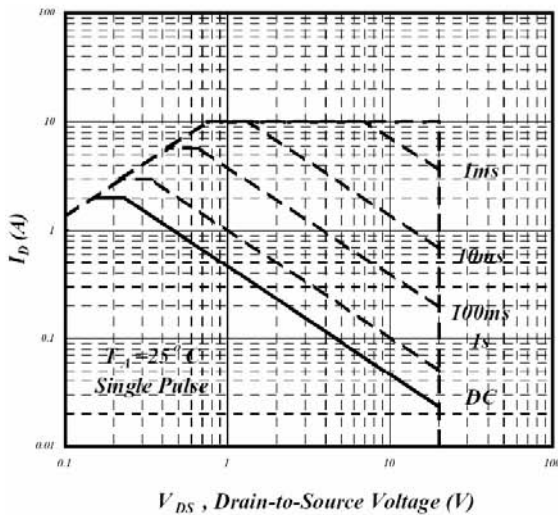


Fig 9. Maximum Safe Operating Area

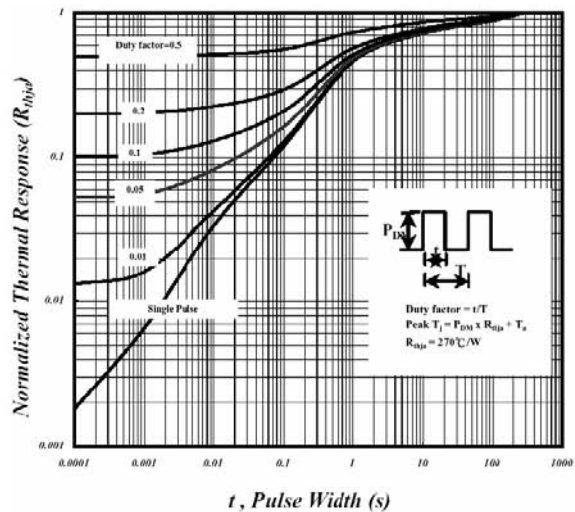


Fig 10. Effective Transient Thermal Impedance

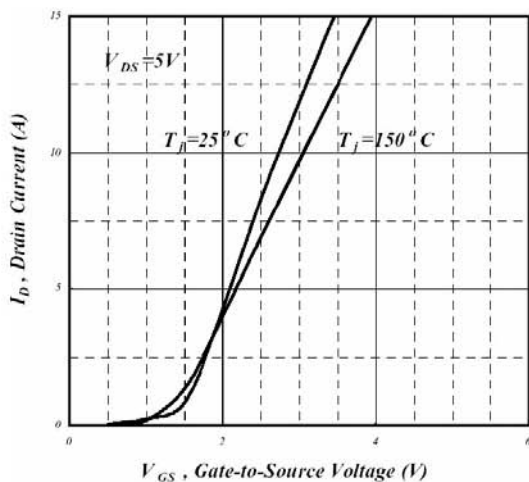


Fig 11. Transfer Characteristics

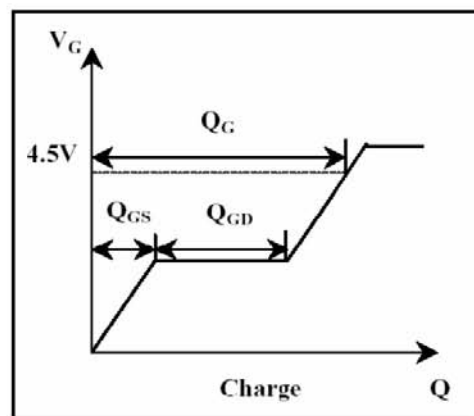


Fig 12. Gate Charge Waveform

Characteristics Curve P-Channel

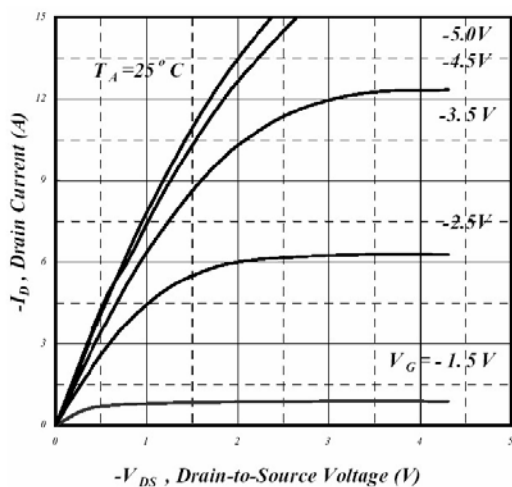


Fig 1. Typical Output Characteristics

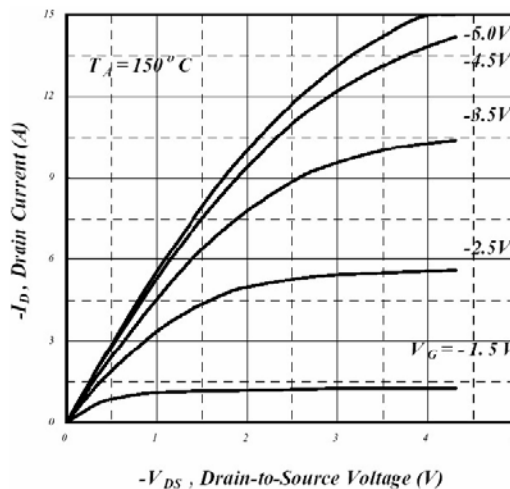


Fig 2. Typical Output Characteristics

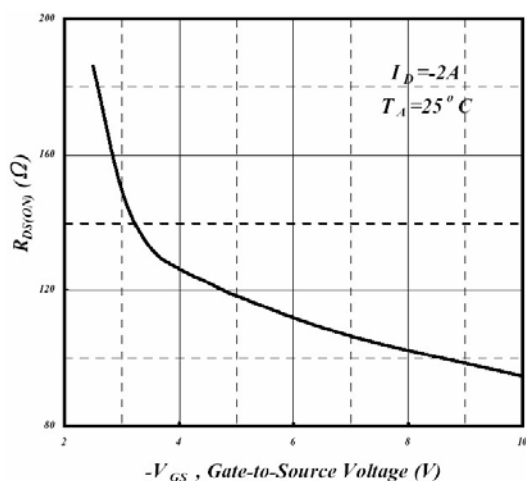
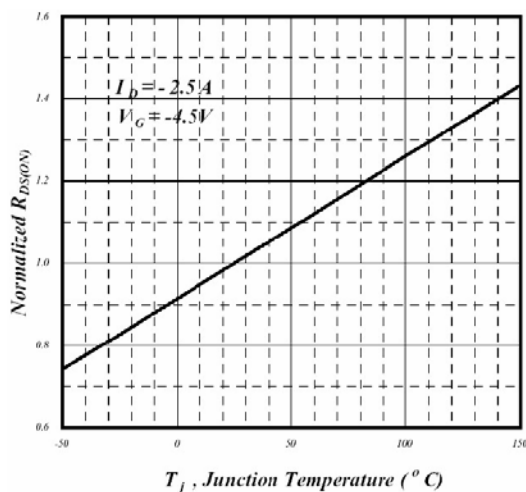
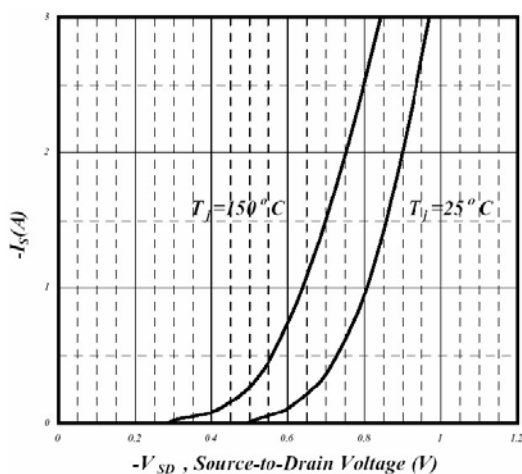
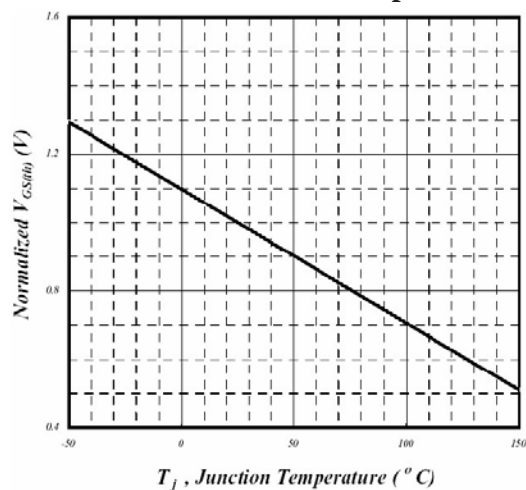


Fig 3. On-Resistance v.s. Gate Voltage

Fig 4. Normalized On-Resistance
v.s. Junction TemperatureFig 5. Forward Characteristics of
Reverse DiodeFig 6. Gate Threshold Voltage v.s.
Junction Temperature

P-Channel

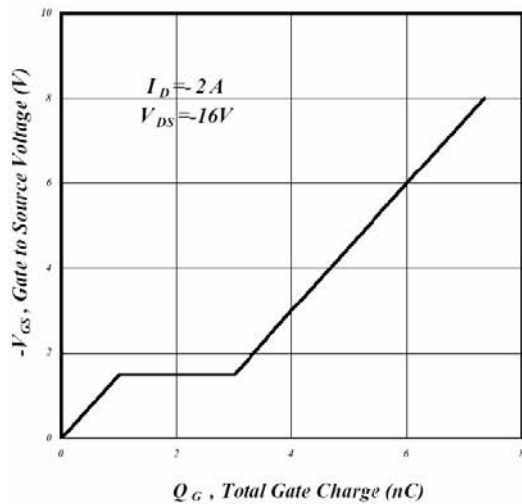


Fig 7. Gate Charge Characteristics

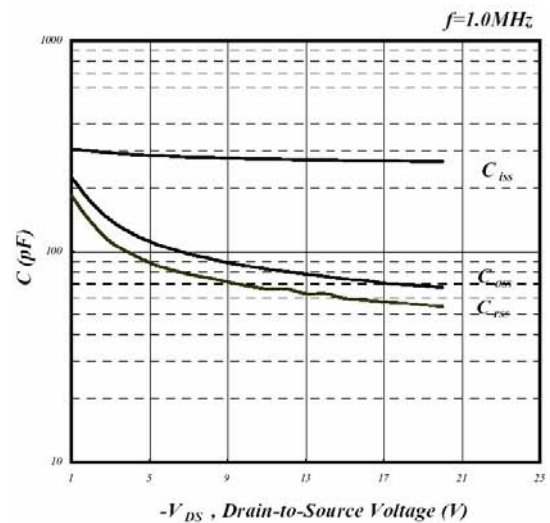


Fig 8. Typical Capacitance Characteristics

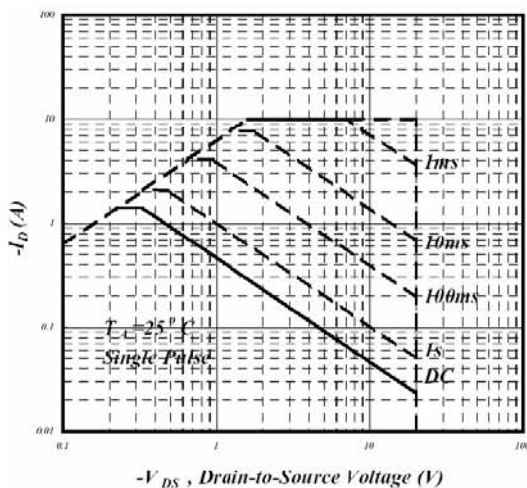


Fig 9. Maximum Safe Operating Area

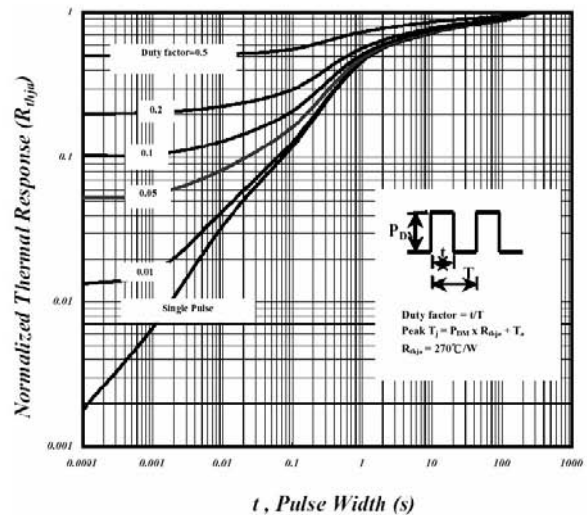


Fig 10. Effective Transient Thermal Impedance

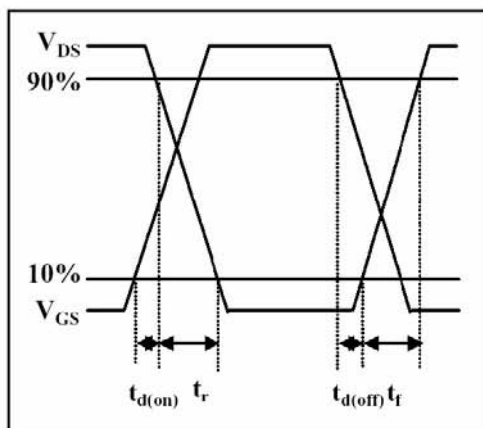


Fig 11. Transfer Characteristics

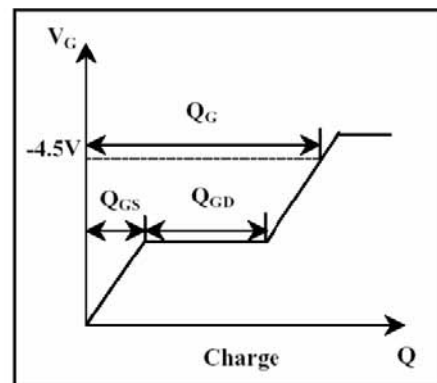
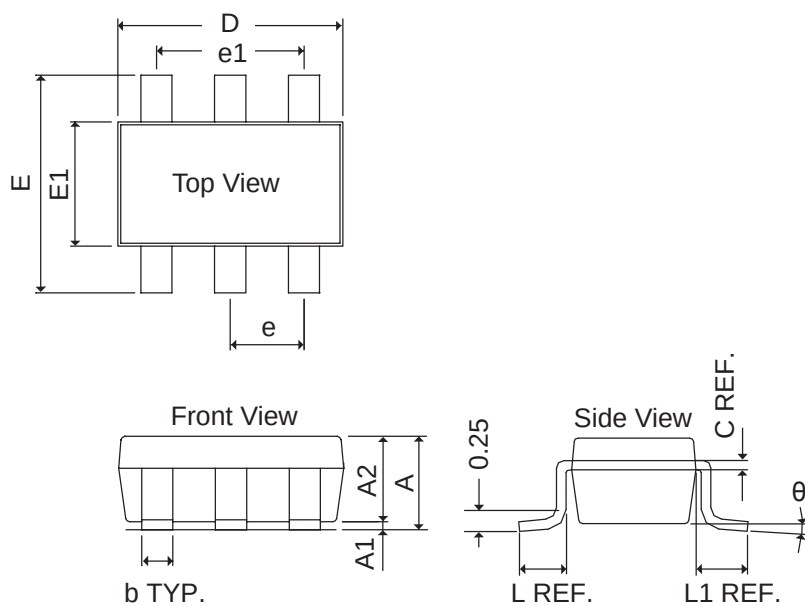


Fig 12. Gate Charge Waveform

TSOP-6 Outline Dimension

Unit:mm



TSOP-6		
Dim	Min	Max
A	-	1.10
A1	0	0.10
A2	0.70	1.00
C	0.12 REF.	
D	2.70	3.10
E	2.60	3.00
E1	1.40	1.80
L	0.45 REF.	
L1	0.60 REF.	
θ	0°	10°
b	0.30	0.50
e	0.95 REF.	
e1	1.90 REF.	