SemTron Microtech Corporation

SMC4545M

Complementary MOSFET

■DESCRIPTION

The SMC4545 is the N+P Complementary mode power field effect transistors are using trench DMOS technology. advanced trench technology to provide excellent $R_{DS(ON)}$.
This device is widely preferred for commercial-industrial surface mount applications and suited for low voltage applications such.

■PART NUMBER INFORMATION

SMC 4545 M - TR G
a b c d e

a : Company name.
b : Product Serial number.
c : Package code M:SOP-8
d : Handling code TR:Tape&Reel
e : Green produce code G:*RoHS Compliant*

■FEATURES

N-Channel

V_{DS}=30V, I_D=7.8A

$R_{DS(ON)}$=16mΩ(Typ.)@V_{GS}=10V
$R_{DS(ON)}$=20mΩ(Typ.)@V_{GS}=4.5V

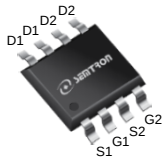
P-Channel

V_{DS}=-30V, I_D=-5.3A

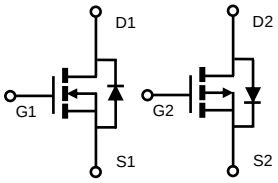
$R_{DS(ON)}$=38mΩ(Typ.)@V_{GS}=-10V
$R_{DS(ON)}$=56mΩ(Typ.)@V_{GS}=-4.5V

■APPLICATIONS

◆Hight Frequency Synchronous Buck DC-DC Converter
◆Portable Equipment and Battery Powered



SOP-8



N-ch P-ch

■ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless otherwise noted)

Symbol	Parameter		Rating		Units
			N-ch	P-ch	
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		±20	±20	V
I_D	Continuous Drain Current	T_A=25°C	7.8	-5.3	A
		T_A=70°C	6.4	-4.2	A
I_{DM}	Pulsed Drain Current [A]		31.2	-21.2	A
I_{AS}	Avalanche Current [A]		15	-15	A
E_{AS}	Single Pulse Avalanche energy L=0.3mH [AE]		33	33	mJ
P_D	Power Dissipation [B]	T_A=25°C	2	2	W
		T_A=70°C	1.3	1.3	W
T_J	Operation Junction Temperature		-55/150		°C
T_{STG}	Storage Temperature Range		-55/150		°C

■THERMAL RESISTANCE

Symbol	Parameter		Typ	Max	Units
$R_{\theta JA}$	Thermal Resistance Junction to Ambient [B]	t≦10s		62	°C/W
	Thermal Resistance Junction to Ambient [BC]	Steady-State		90	

■N-ch ELECTRICAL CHARACTERISTICS(T_A = 25°C Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1	1.5	2	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V, T_J=25°C			1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=75°C			10	
$R_{DS(ON)}$	Drain-source On-Resistance [D]	V_{GS}=10V, I_D=7.8A V_{GS}=4.5V, I_D=6A		16 20	20 26	mΩ
G_{fs}	Forward Transconductance	V_{DS}=10V, I_D=6A		6		S
Diode Characteristics						
V_{SD}	Diode Forward Voltage [D]	I_S=1A, V_{GS}=0V			1	V
I_S	Diode Continuous Forward Current				7.8	A
t_{rr}	Reverse Recovery Time	I_S=6A, dI/dt=100A/μs T_J=25°C		12.5		ns
Q_{rr}	Reverse Recovery Charge			3.2		nC
Dynamic and Switching Parameters [E]						
Q_g	Total Gate Charge	V_{DS}=15V,V_{GS}=10V, I_D=6A		12.7	17.8	nC
Q_g	Total Gate Charge (4.5V)			6.2	8.7	
Q_{gs}	Gate-Source Charge			2.4	3.4	
Q_{gd}	Gate-Drain Charge			2	2.8	
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1MHz		550		pF
C_{oss}	Output Capacitance			78		
C_{rss}	Reverse Transfer Capacitance			62		
$t_{d(on)}$	Turn-On Time	V_{DD}=15V, V_{GEN}=10V R_G=3.3Ω, I_D=1A		2.5	5	nS
t_r				7.6	14	
$t_{d(off)}$	Turn-Off Time			19.8	38	
t_f				4.2	8	

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

A. Surface mounted on FR4 board using 1 in^2 pad size.
B. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}$=150°C.
C. Using ≤ 10s junction-to-ambient thermal resistance is base on $T_{J(MAX)}$=150°C.
D. Pulse test width ≤300μs and duty cycle ≤ 2%.
E. Guaranteed by design, not subject to production testing.

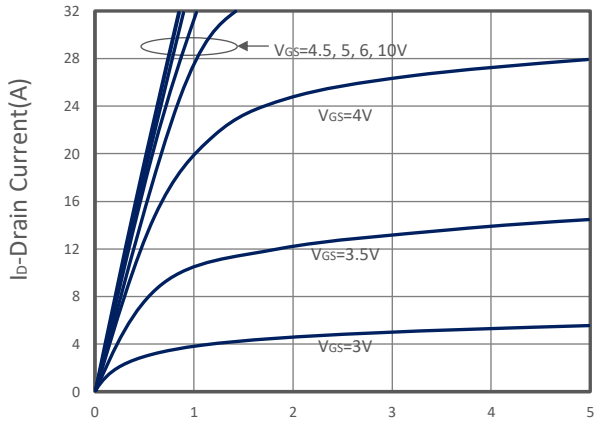
P-ch ELECTRICAL CHARACTERISTICS(T_A = 25°C Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.5	-2	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V, T_J=25°C			-1	μA
		V_{DS}=-24V, V_{GS}=0V, T_J=75°C			-10	
$R_{DS(ON)}$	Drain-source On-Resistance [D]	V_{GS}=-10V, I_D=-5.3A V_{GS}=-4.5V, I_D=-4A		38 56	45 60	mΩ
G_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-4.5A		12		S
Diode Characteristics						
V_{SD}	Diode Forward Voltage [D]	I_S=-1A, V_{GS}=0V			-1	V
I_S	Diode Continuous Forward Current				-5.3	A
t_{rr}	Revese Recovery Time	I_S=-4.5A, dI/dt=100A/μs T_J=25°C		8.1		ns
Q_{rr}	Revese Recovery Charg			2.7		nC
Dynamic and Switching Parameters [E]						
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-10V I_D=-4.5A		13.9	19.5	nC
Q_g	Total Gate Charge (4.5V)			6.8	9.5	
Q_{gs}	Gate-Source Charge			2.9	4.1	
Q_{gd}	Gate-Drain Charge			3.5	4.9	
C_{iss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, f=1MHz		750		pF
C_{oss}	Output Capacitance			95		
C_{rss}	Reverse Transfer Capacitance			82		
$t_{d(on)}$	Turn-On Time	V_{DD}=-15V, V_{GEN}=-10V R_G=6Ω, I_D=-1A		4	8	nS
t_r				10	19	
$t_{d(off)}$	Turn-Off Time			28.5	42	
t_f				7.6	14	

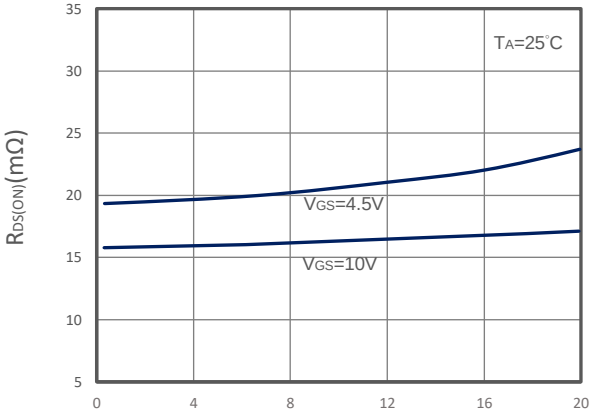
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

A. Surface mounted on FR4 board using 1 in^2 pad size.
B. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}$=150°C.
C. Using ≤ 10s junction-to-ambient thermal resistance is base on $T_{J(MAX)}$=150°C.
D. Pulse test width ≤300μs and duty cycle ≤ 2%.
E. Guaranteed by design, not subject to production testing.

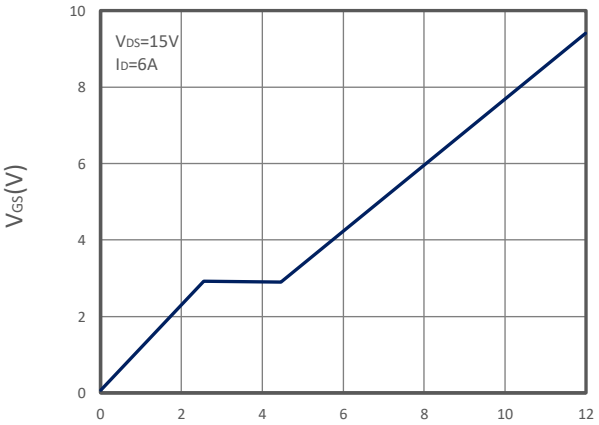
■N-ch TYPICAL CHARACTERISTICS



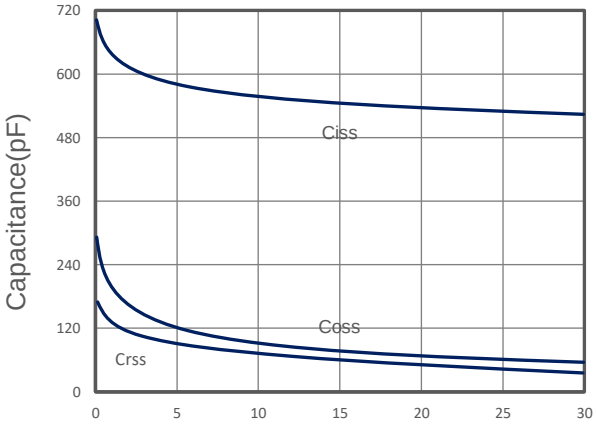
Output Characteristics



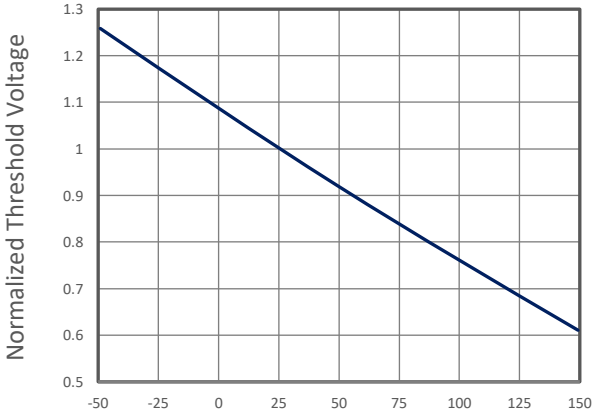
Drain-Source On Resistance



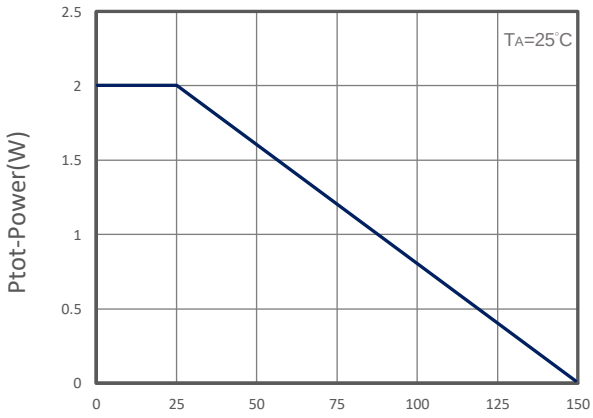
Gate Charge



Capacitance

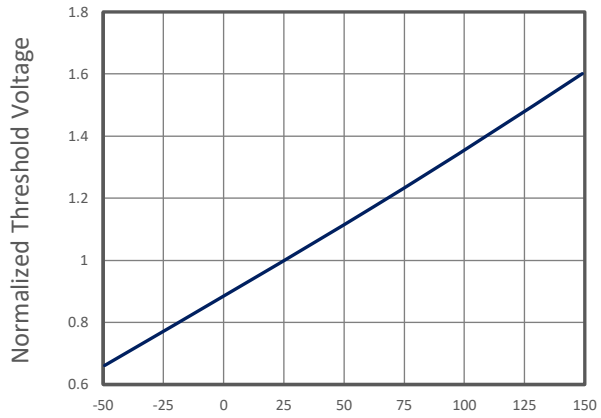


Gate Threshold Voltage



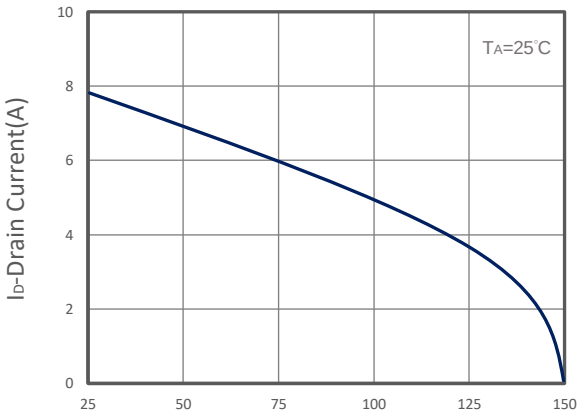
Power Dissipation

■N-ch TYPICAL CHARACTERISTICS



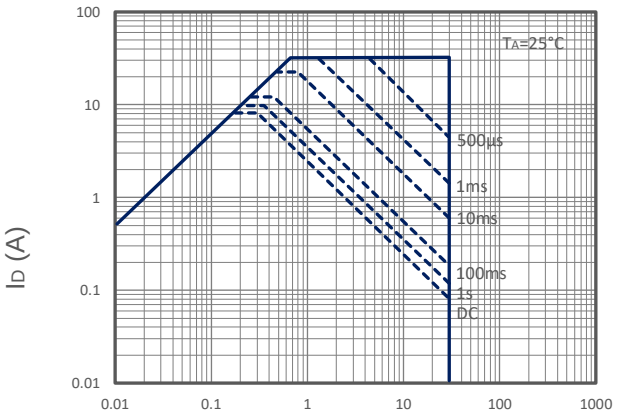
TJ-Junction Temperature(°C)

Gate Threshold Voltage



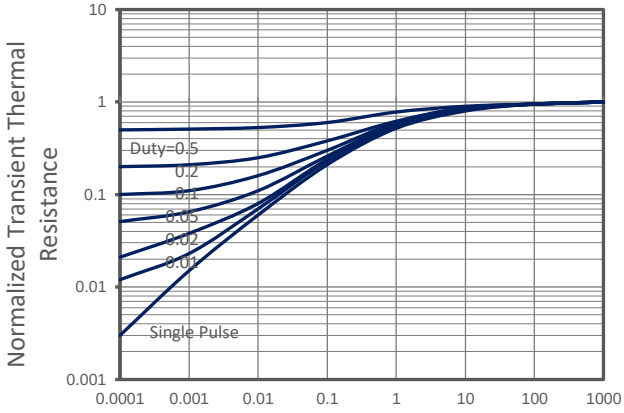
TJ-Junction Temperature(°C)

Drain Current vs TJ



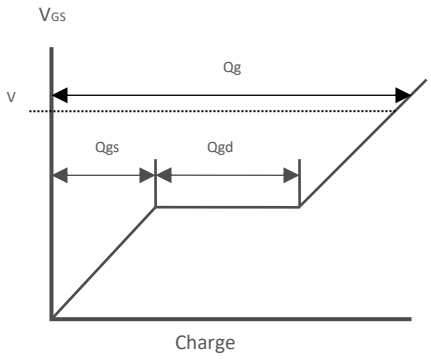
VDS Voltage (V)

Maximum Safe Operation Area

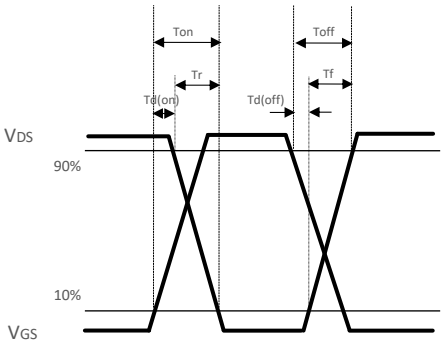


Square Wave Pulse Duration(Sec)

Thermal Transient Impedance

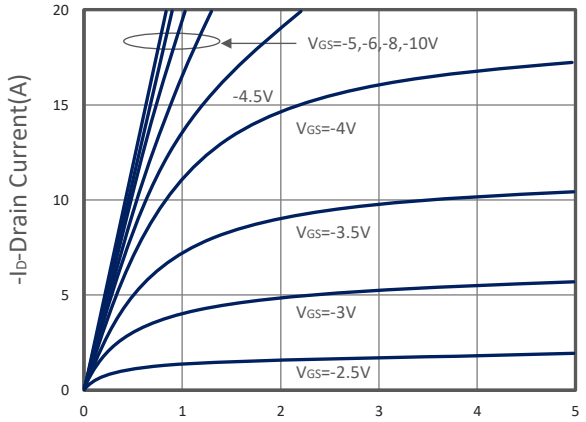


Gate Chrge Waveform

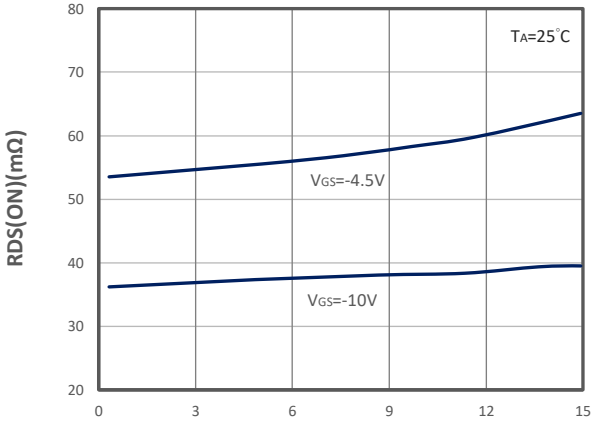


Switching Time Waveform

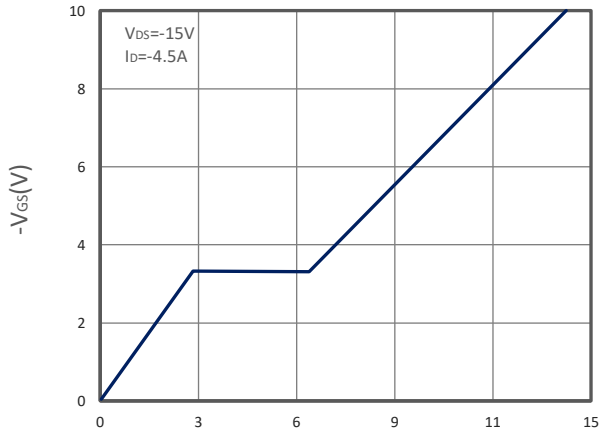
■P-ch TYPICAL CHARACTERISTICS



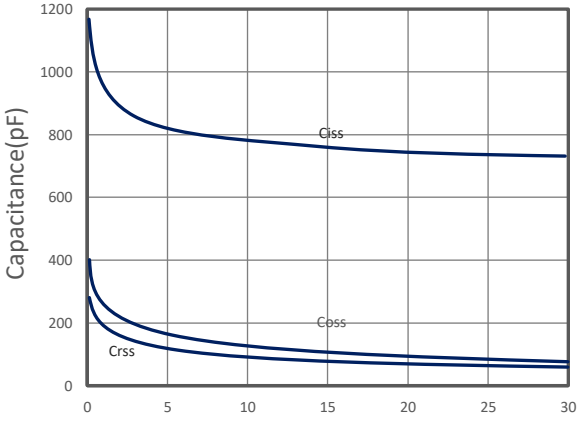
Output Characteristics



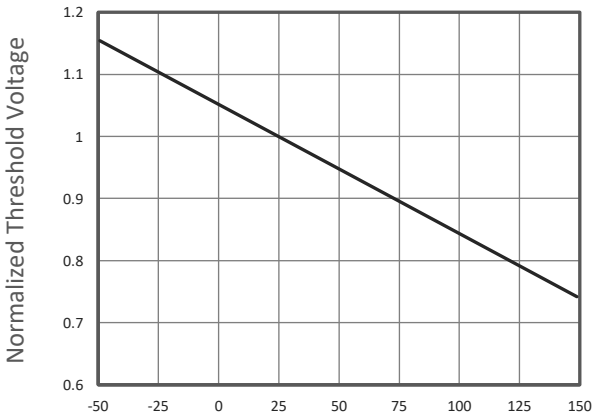
Drain-Source On Resistance



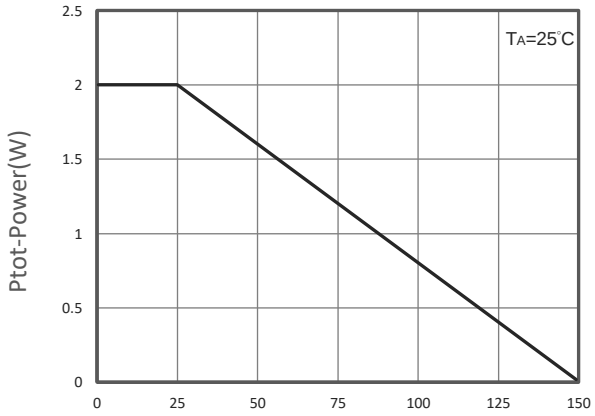
Gate Charge



Capacitance

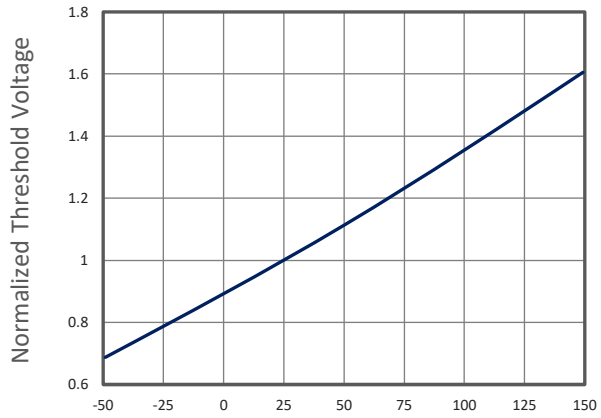


Gate Threshold Voltage



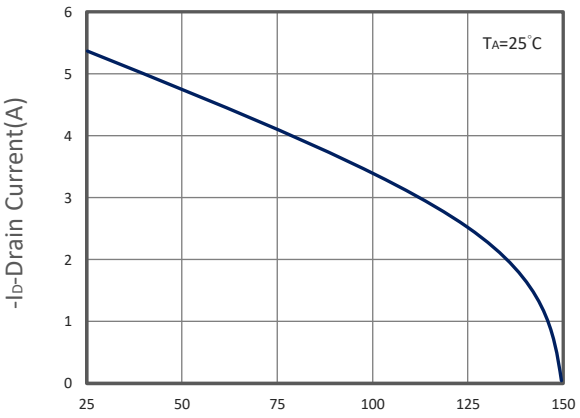
Power Dissipation

■P-ch TYPICAL CHARACTERISTICS



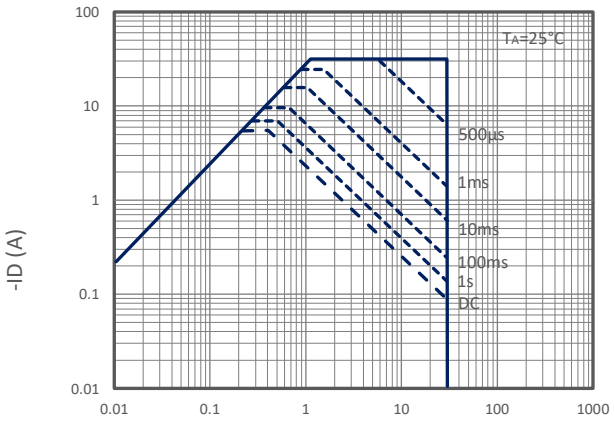
TJ-Junction Temperature(°C)

Gate Threshold Voltage



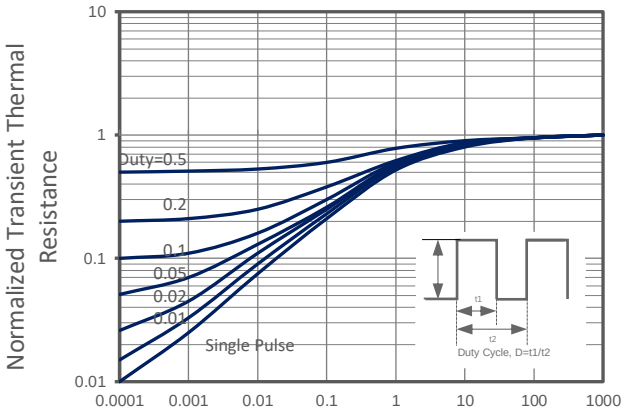
TJ-Junction Temperature(°C)

Drain Current vs TJ



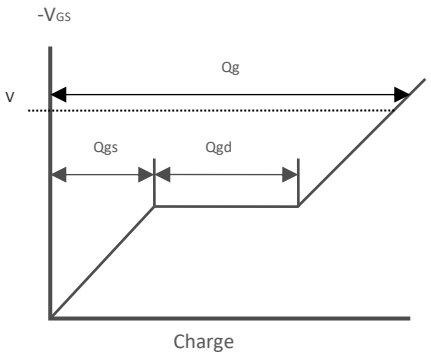
- VDS Voltage (V)

MAXIMUM SAFE OPERATION AREA

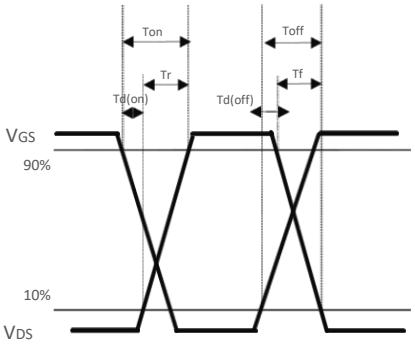


Square Wave Pulse Duration(Sec)

Thermal Transient Impedance

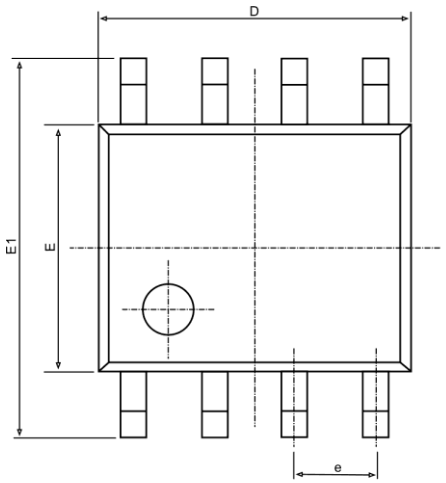


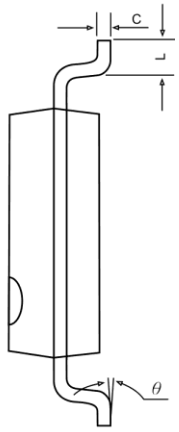
Gate Chrge Waveform

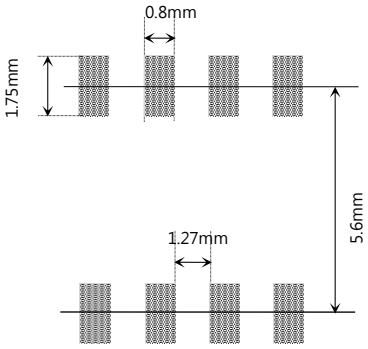


Switching Time Waveform

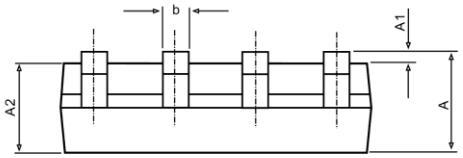
■SOP-8 PACKAGE DIMENSIONS







Recommended Land Pattern



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.040.	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.130	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270BSC.		0.050BSC.	
L	0.400	1.270	0.016	0.005
Θ	0°	8°	0°	8°