

20V Complementary MOSFET

DESCRIPTION

The SMC2520CSQ is the N+P channel complementary mode power field effect transistors, used trench technology are well suited for high efficiency fast switching applications, this devices are well suited for applications in the small surface mount package.

PART NUMBER INFORMATION

SMC 2520 C SQ - TR G
 a b c d e f

a : Company name
 b : Product Serial number
 c : Complementary
 d : Package code SQ: SOT-23-6L
 e : Handling code TR: Tape&Reel
 f : Green produce code G: RoHS Compliant

FEATURES

N-Channel

$V_{DS}=20V$, $I_D=5A$

$R_{DS(ON)}=30m\Omega(Typ.)@V_{GS}=4.5V$

$R_{DS(ON)}=38m\Omega(Typ.)@V_{GS}=2.5V$

$R_{DS(ON)}=50m\Omega(Typ.)@V_{GS}=1.8V$

P-Channel

$V_{DS}=-20V$, $I_D=-3.3A$

$R_{DS(ON)}=60m\Omega(Typ.)@V_{GS}=-4.5V$

$R_{DS(ON)}=80m\Omega(Typ.)@V_{GS}=-3.5V$

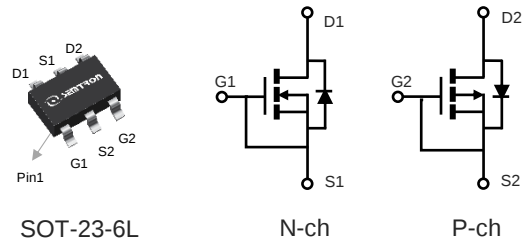
$R_{DS(ON)}=110m\Omega(Typ.)@V_{GS}=-1.8V$

◆ High-speed switching, Low On-resistance

APPLICATIONS

◆ DC/DC Converter

◆ Load Switch



ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ C$ Unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-ch	P-ch	
V_{DSS}	Drain-Source Voltage	20	-20	V
V_{GSS}	Gate-Source Voltage	± 10	± 10	V
I_D	Continuous Drain Current	5	-3.3	A
		4	-2.7	A
I_{DM}	Pulsed Drain Current ^B	20	-13.6	A
P_D	Power Dissipation ^A	1.3	1.3	W
		0.8	0.8	W
T_J	Operation Junction Temperature	-55/150		$^\circ C$
T_{STG}	Storage Temperature Range	-55/150		$^\circ C$

THERMAL RESISTANCE

Symbol	Parameter		Typ	Max	Units
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ^A	$t \leq 10s$		95	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State		130	

■ N-ch ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ Unless otherwise noted)

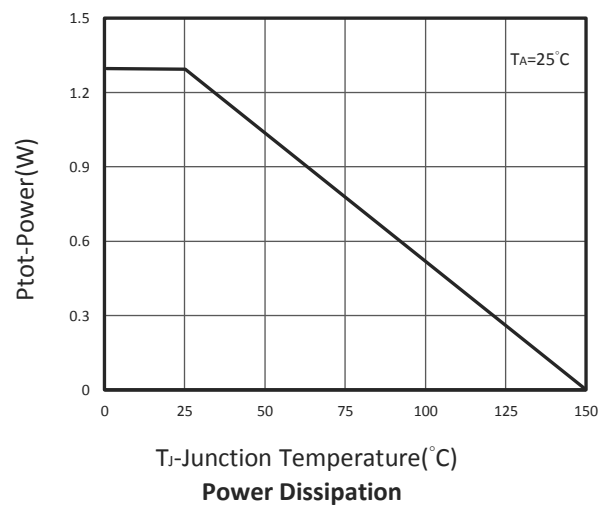
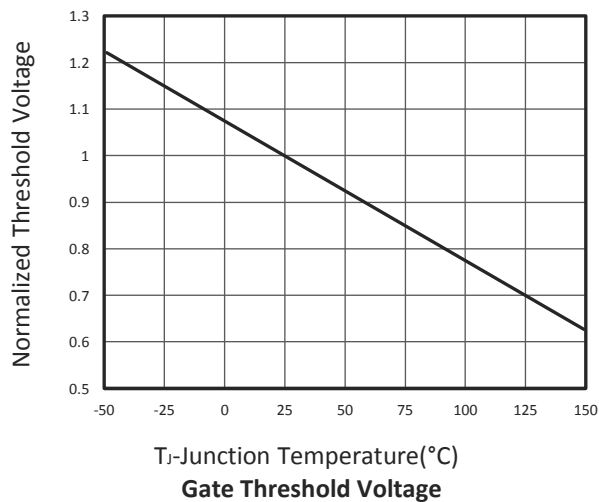
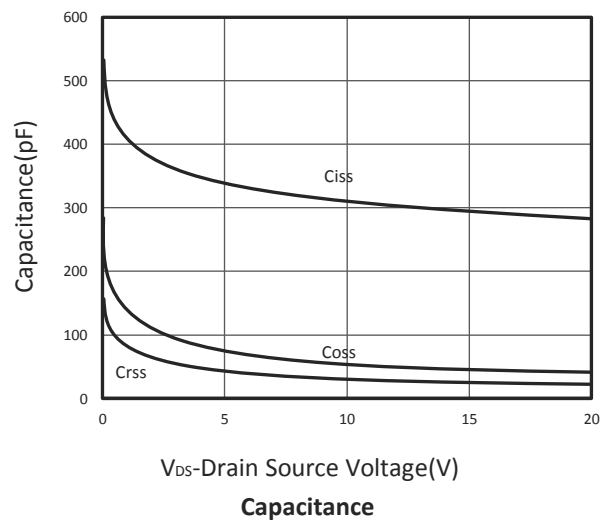
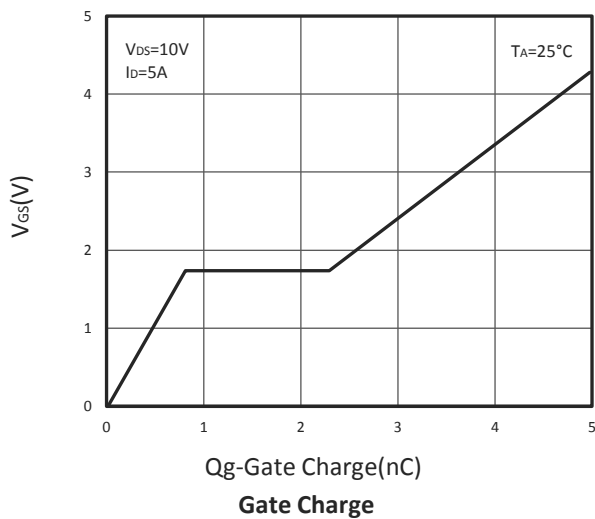
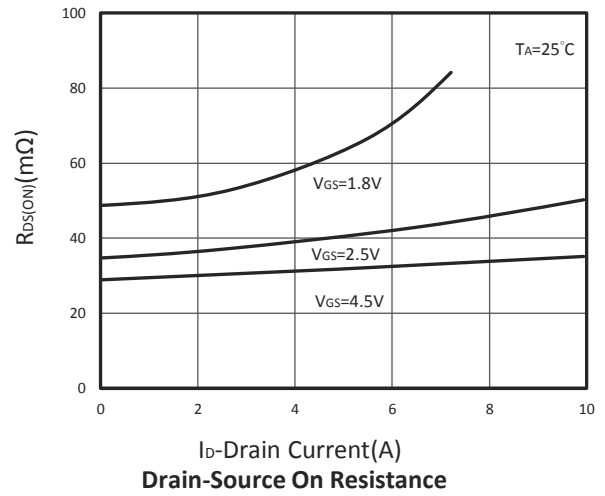
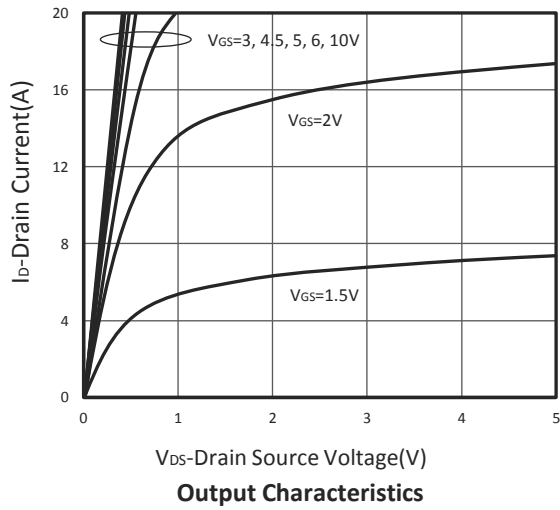
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4	0.6	1	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±10V			±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C			1	μA
		V _{DS} =16V,V _{GS} =0V, T _J =75°C			10	
R _{DS(ON)}	Drain-source On-Resistance [Ⓟ]	V _{GS} =4.5V, I _D =4A V _{GS} =2.5V, I _D =3A V _{GS} =1.8V, I _D =2A		30 38 50	35 45 60	mΩ
G _{fs}	Forward Transconductance	V _{DS} =5V, I _D =4A		4		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage [Ⓟ]	I _S =1A, V _{GS} =0V			1	V
I _S	Diode Continuous Forward Current				2.5	A
Dynamic and Switching Parameters [Ⓔ]						
Q _g	Total Gate Charge	V _{DS} =10V, V _{GS} =4.5V, I _D =5A		5.7	8	nC
Q _{gs}	Gate-Source Charge			0.8	1.1	
Q _{gd}	Gate-Drain Charge			1.5	2.1	
C _{iss}	Input Capacitance	V _{DS} =10V,V _{GS} =0V, f=1MHz		305		pF
C _{oss}	Output Capacitance			52		
C _{rss}	Reverse Transfer Capacitance			43		
t _{d(on)}	Turn-On Time	V _{DD} =10V, V _{GEN} =4.5V R _G =6Ω, I _D =1A		3	6	nS
t _r				7.8	15	
t _{d(off)}	Turn-Off Time			12	23	
t _f				5.4	10	

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

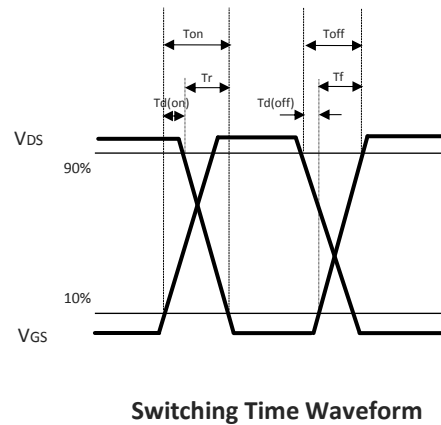
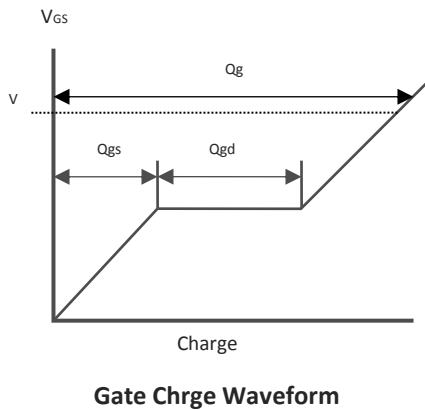
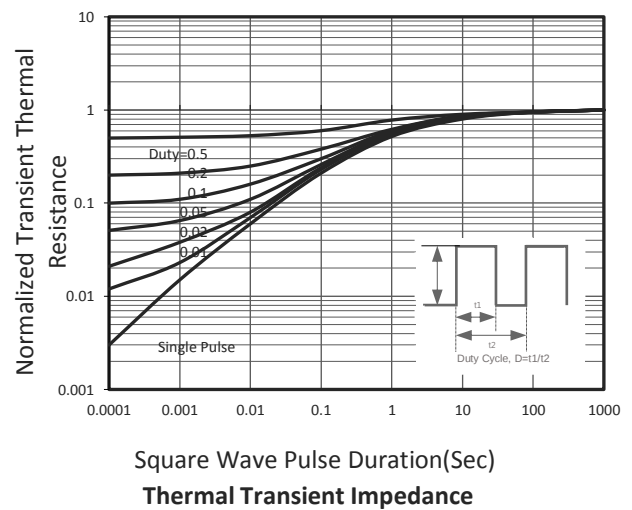
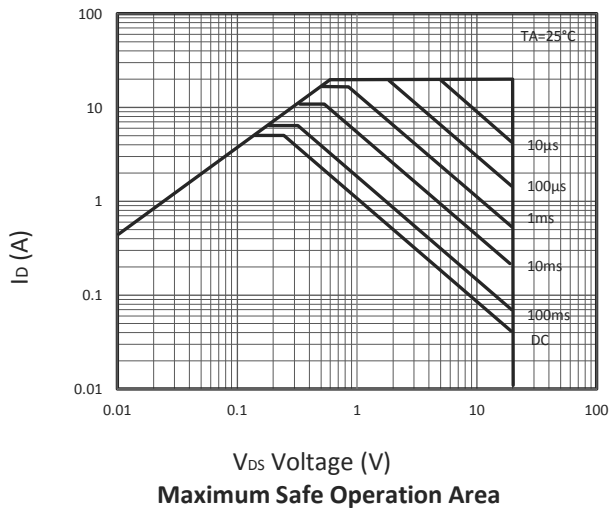
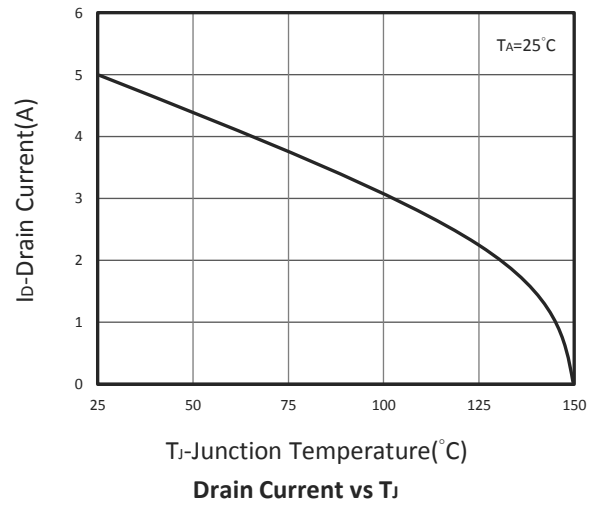
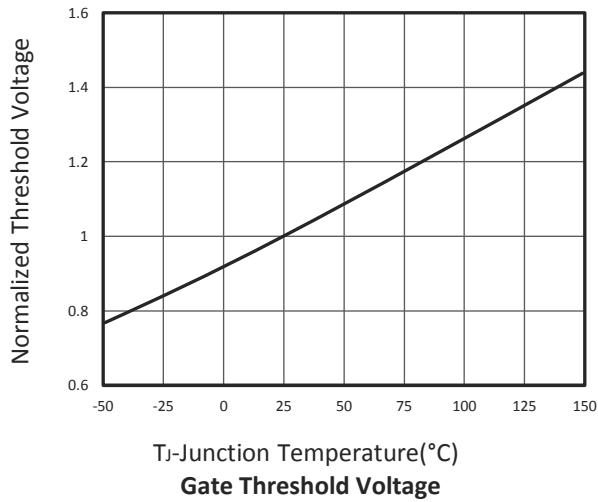
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}=150^\circ\text{C}$ (initial temperature $T_J=25^\circ\text{C}$).
- C. Using $\leq 10\text{s}$ junction-to-ambient thermal resistance is base on $T_{J(MAX)}=150^\circ\text{C}$.
- D. Pulse test width $\leq 300\mu\text{s}$ and duty cycle $\leq 2\%$.
- E. Guaranteed by design, not subject to production testing.

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N-ch TYPICAL CHARACTERISTICS



N-ch TYPICAL CHARACTERISTICS



■ P-ch ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

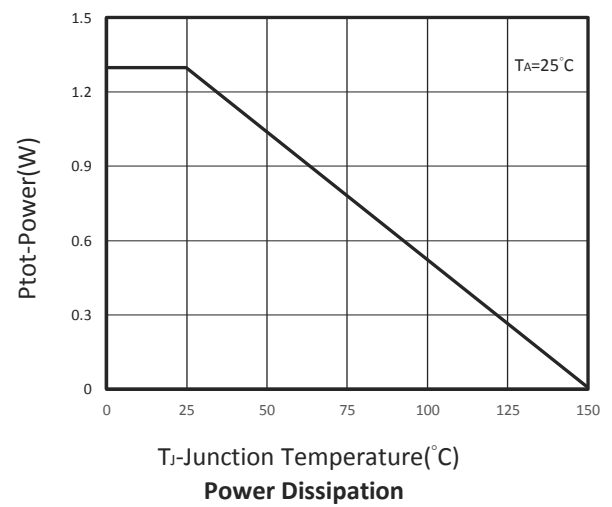
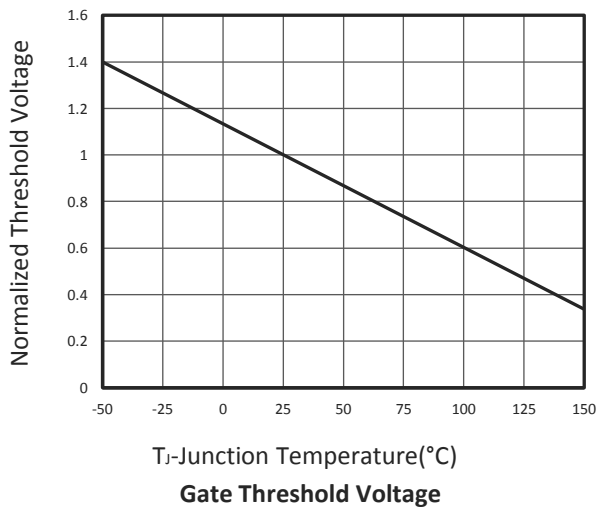
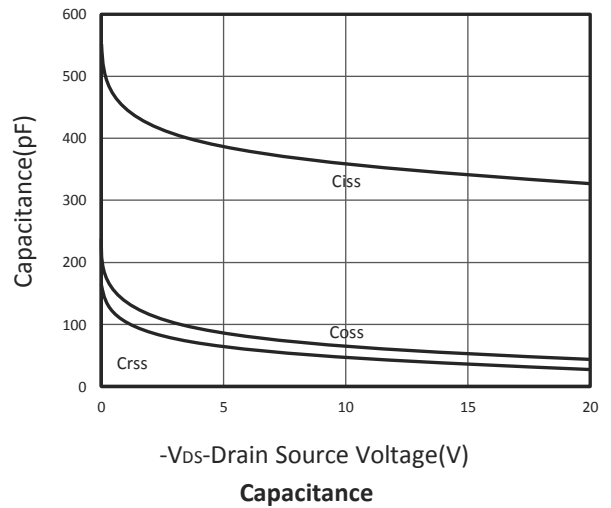
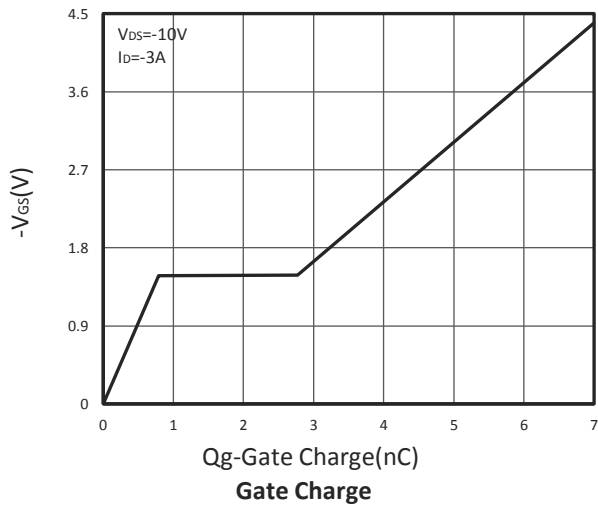
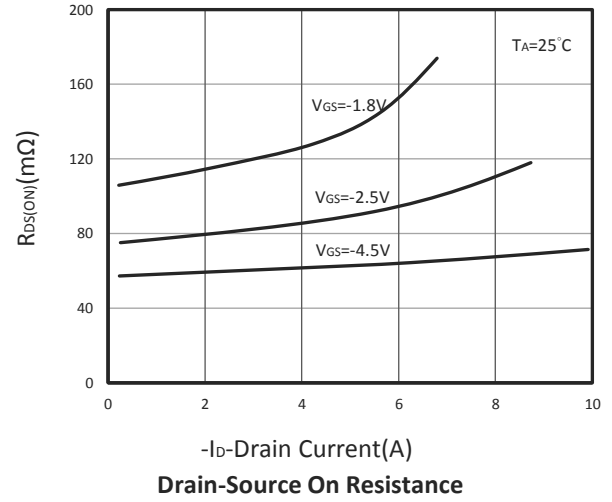
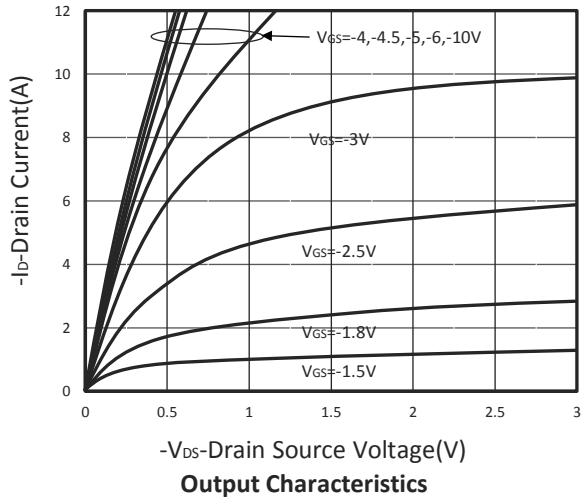
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-20			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.7	-1	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±10V			±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C			-1	μA
		V _{DS} =-16V, V _{GS} =0V, T _J =75°C			-10	
R _{DS(ON)}	Drain-source On-Resistance °	V _{GS} =-4.5V, I _D =-3.3A V _{GS} =-2.5V, I _D =-2.5A V _{GS} =-1.8V, I _D =-1.8A		60 80 110	75 100 130	mΩ
G _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-3A		2.5		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage °	I _S =-1A, V _{GS} =0V			-1	V
I _S	Diode Continuous Forward Current				-3.2	A
t _{rr}	Reverse Recovery Time	I _S =-3A, dI/dt=100A/μs		13.2		ns
Q _{rr}	Reverse Recovery Charge	T _J =25°C		7.4		nC
Dynamic and Switching Parameters [°]						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-3A		7.2	10.1	nC
Q _{gs}	Gate-Source Charge			0.8	1.1	
Q _{gd}	Gate-Drain Charge			2	2.8	
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz		360		pF
C _{oss}	Output Capacitance			70		
C _{rss}	Reverse Transfer Capacitance			55		
t _{d(on)}	Turn-On Time	V _{DD} =-10V, V _{GEN} =-4.5V, R _G =3Ω, I _D =-3A		4.8	9	nS
t _r				12.8	24	
t _{d(off)}	Turn-Off Time			20	38	
t _f				6	11	

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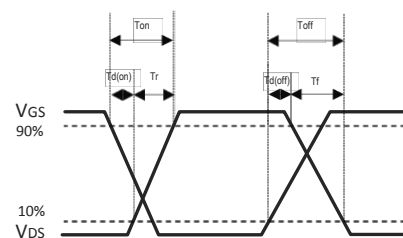
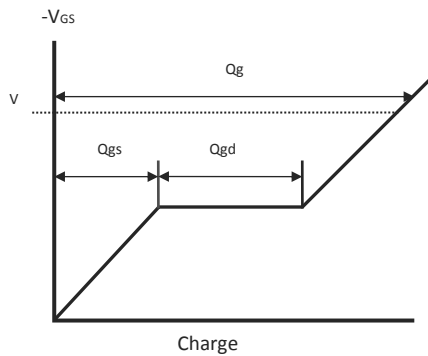
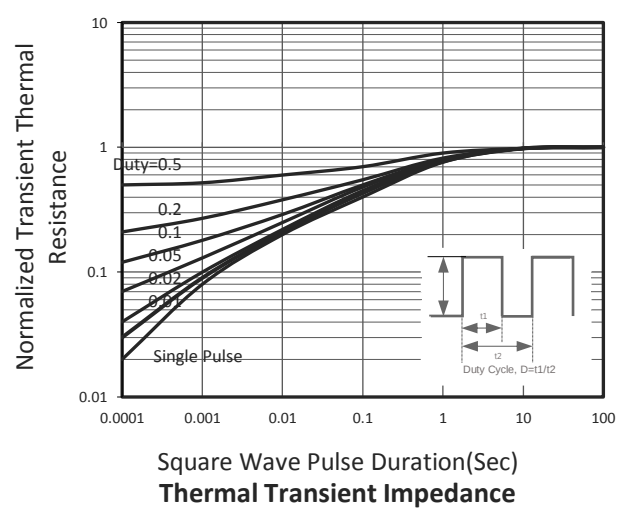
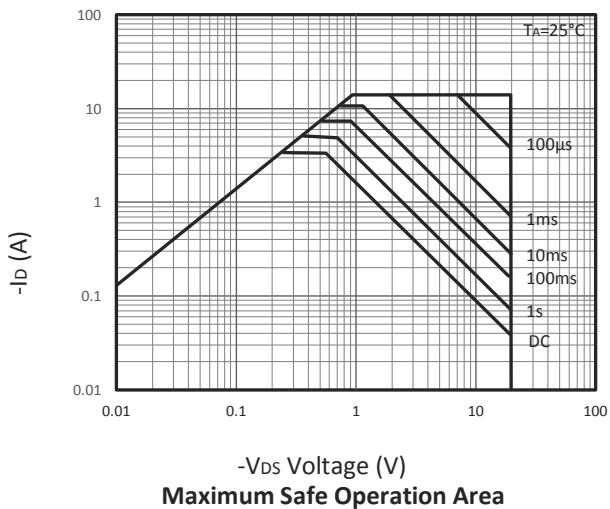
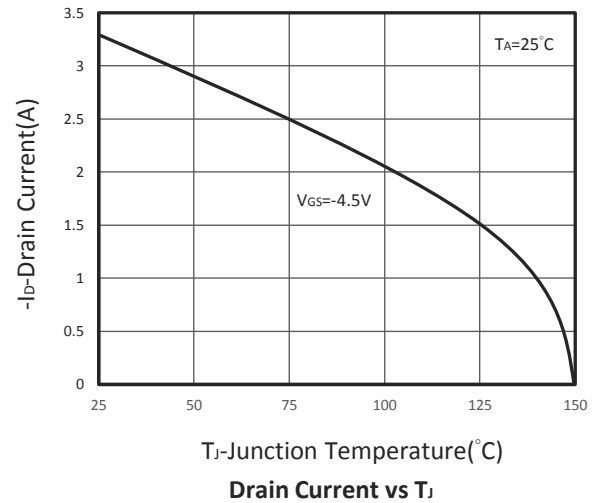
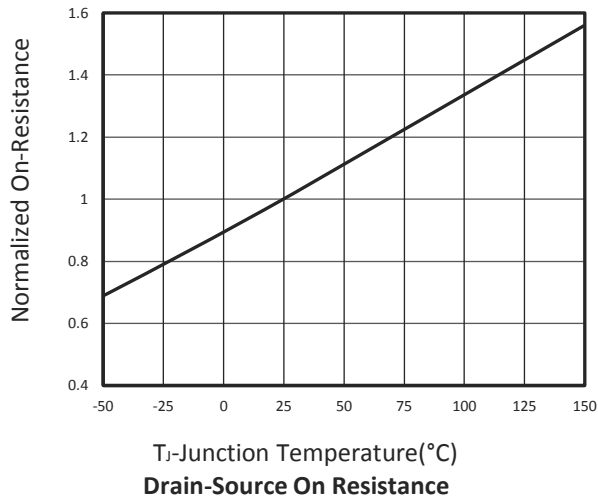
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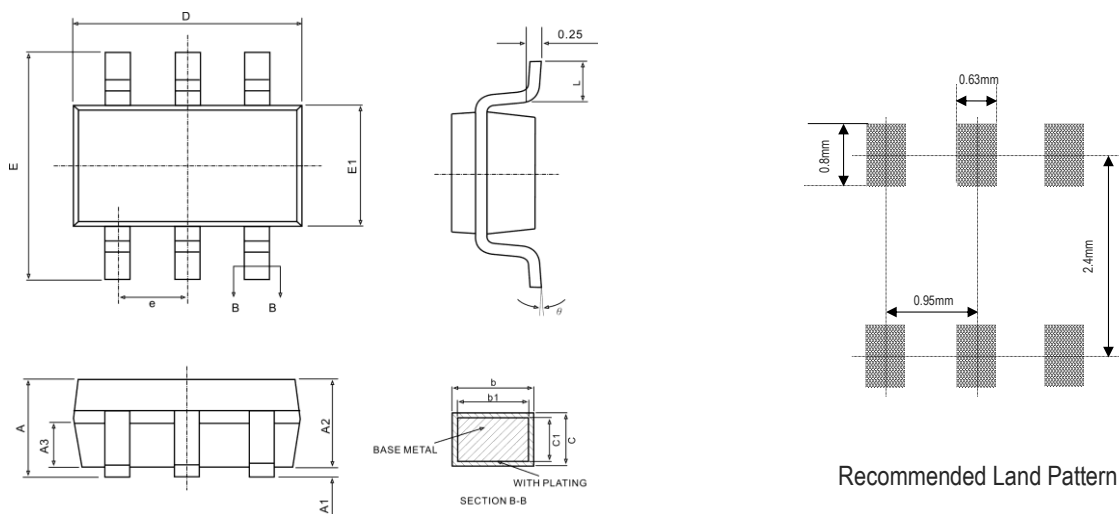
P-ch TYPICAL CHARACTERISTICS



P-ch TYPICAL CHARACTERISTICS



■ SOT-23-6L PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	-	1.300	-	0.051
A1	0.040	0.100	0.002	0.004
A2	1.000	1.200	0.039	0.047
A3	0.550	0.750	0.022	0.030
b	0.340	0.430	0.013	0.017
b1	0.330	0.380	0.013	0.015
c	0.150	0.210	0.006	0.008
c1	0.140	0.160	0.006	0.006
D	2.720	3.120	0.107	0.123
E	2.600	3.000	0.102	0.118
E1	1.400	1.800	0.055	0.071
e	0.950 BSC		0.066 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°