

SPRD4503-C

N-Ch: 28A, 30V, $R_{DS(ON)}$ 18m Ω
P-Ch: -22A, -30V, $R_{DS(ON)}$ 30m Ω
N & P-Ch Enhancement Mode Power MOSFET

RoHS Compliant Product
 A suffix of "-C" specifies halogen & lead-free

DESCRIPTION

The SPRD4503-C is the highest performance trench N-Ch and P-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The SPRD4503-C meet the RoHS and Green Product requirement with full function reliability approved.

FEATURES

- Advanced High Cell Density Trench Technology
- Super Low Gate Charge
- Green Device Available

MARKING



PACKAGE INFORMATION

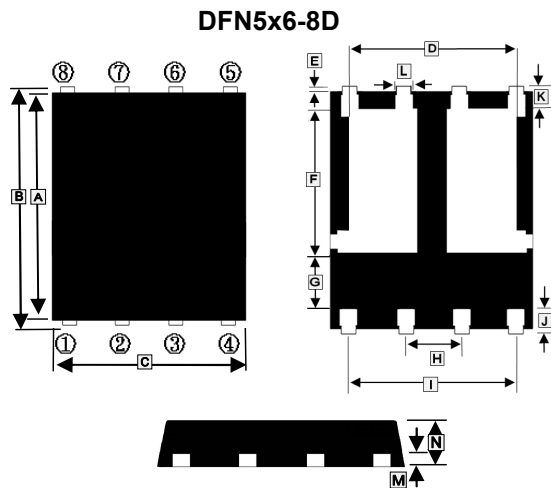
Package	MPQ	Leader Size
DFN5x6-8D	3K	13 inch

ORDER INFORMATION

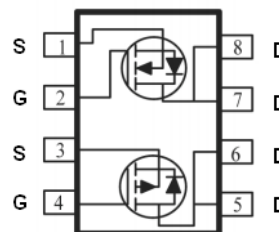
Part Number	Type
SPRD4503-C	Lead (Pb)-free and Halogen-free

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings		Unit
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20		V
Continuous Drain Current, @ $V_{GS}=10V$ ¹	$T_C=25^\circ C$	28	-22	A
	$T_C=100^\circ C$	18	-14	
	$T_A=25^\circ C$	7	-5.4	
	$T_A=70^\circ C$	5.6	-4.3	
Pulsed Drain Current ³	I_{DM}	62	-48	A
Total Power Dissipation	$T_C=25^\circ C$	P_D 22		W
Total Power Dissipation	$T_A=25^\circ C$	P_D 1.7		
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~150		°C
Thermal Data				
Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	73.5		°C/W
Thermal Resistance Junction-Ambient ²		125		
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	5.7		



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.7	5.8	H	1.27 BSC.	
B	5.9	6.1	I	3.61	3.96
C	4.8	5	J	0.51	0.71
D	3.61	3.96	K	0.41	0.61
E	0.06	0.20	L	0.33	0.51
F	3.38	3.78	M	0.2	0.3
G	1.1	-	N	0.9	1.1



N-CHANNEL ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
Drain-Source Breakdown Voltage	BV_{DSS}	30	-	-	V	$V_{GS}=0, I_D=250\mu\text{A}$	
Gate Threshold Voltage	$V_{GS(th)}$	1	-	3	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	
Forward Transfer Conductance	g_{fs}	-	6	-	S	$V_{DS}=5\text{V}, I_D=7\text{A}$	
Gate-Source Leakage Current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{V}$	
Drain-Source Leakage Current	I_{DSS}	$T_J=25^\circ\text{C}$	-	-	1	μA	$V_{DS}=24\text{V}, V_{GS}=0$
		$T_J=55^\circ\text{C}$	-	-	5		
Static Drain-Source On-Resistance ⁴	$R_{DS(ON)}$	-	-	18	m Ω	$V_{GS}=10\text{V}, I_D=6\text{A}$	
		-	-	28		$V_{GS}=4.5\text{V}, I_D=4\text{A}$	
Total Gate Charge	Q_g	-	6	-	nC	$I_D=6\text{A}$ $V_{DS}=15\text{V}$ $V_{GS}=4.5\text{V}$	
Gate-Source Charge	Q_{gs}	-	2.5	-			
Gate-Drain Change	Q_{gd}	-	2.1	-			
Turn-on Delay Time	$T_{d(on)}$	-	2.4	-	nS	$V_{DS}=15\text{V}$ $V_{GS}=10\text{V}$ $I_D=6\text{A}$ $R_G=3.3\Omega$	
Rise Time	T_r	-	7.8	-			
Turn-off Delay Time	$T_{d(off)}$	-	22	-			
Fall Time	T_f	-	4	-			
Input Capacitance	C_{iss}	-	572	-	pF	$V_{GS}=0$ $V_{DS}=15\text{V}$ $f=1\text{MHz}$	
Output Capacitance	C_{oss}	-	80	-			
Reverse Transfer Capacitance	C_{rss}	-	65	-			
Source-Drain Diode							
Forward on Voltage ⁴	V_{SD}	-	-	1.2	V	$I_S=1\text{A}, V_{GS}=0, T_J=25^\circ\text{C}$	
Continuous Source Current ¹	I_S	-	-	7	A		
Pulsed Source Current ³	I_{SM}	-	-	28			

P-CHANNEL ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
Drain-Source Breakdown Voltage	BV _{DSS}	-30	-	-	V	V _{GS} =0, I _D = -250μA	
Gate Threshold Voltage	V _{GS(th)}	-1	-	-3	V	V _{DS} =V _{GS} , I _D = -250μA	
Forward Transfer Conductance	g _{fs}	-	13	-	S	V _{DS} = -5V, I _D = -7A	
Gate-Source Leakage Current	I _{GSS}	-	-	±100	nA	V _{GS} = ±20V	
Drain-Source Leakage Current	I _{DSS}	T _J =25°C	-	-	-1	μA	V _{DS} = -24V, V _{GS} =0
		T _J =55°C	-	-	-5		
Static Drain-Source On-Resistance ⁴	R _{DS(ON)}	-	-	30	mΩ	V _{GS} = -10V, I _D = -6A	
		-	-	45		V _{GS} = -4.5V, I _D = -4A	
Total Gate Charge	Q _g	-	9.8	-	nC	I _D = -6A V _{DS} = -20V V _{GS} = -4.5V	
Gate-Source Charge	Q _{gs}	-	2.2	-			
Gate-Drain Change	Q _{gd}	-	3.4	-			
Turn-on Delay Time	T _{d(on)}	-	16.4	-	nS	V _{DS} = -24V V _{GS} = -10V I _D = -1A R _G =3.3Ω	
Rise Time	T _r	-	20.2	-			
Turn-off Delay Time	T _{d(off)}	-	55	-			
Fall Time	T _f	-	10	-			
Input Capacitance	C _{iss}	-	930	-	pF	V _{GS} =0 V _{DS} = -15V f=1MHz	
Output Capacitance	C _{oss}	-	148	-			
Reverse Transfer Capacitance	C _{rss}	-	115	-			
Source-Drain Diode							
Forward on Voltage ⁴	V _{SD}	-	-	-1.2	V	I _S = -1A, V _{GS} =0, T _J =25°C	
Continuous Source Current ¹	I _S	-	-	-5.4	A		
Pulsed Source Current ³	I _{SM}	-	-	-21.6			

Notes:

1. Surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. When mounted on Min. copper pad.
3. Pulse width limited by maximum junction temperature, pulse width ≤ 300μs, duty cycle ≤ 2%.
4. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

N-CHANNEL CHARACTERISTIC CURVE

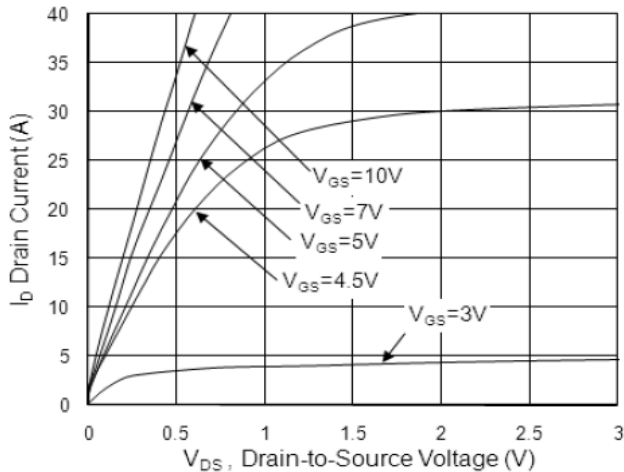


Fig.1 Typical Output Characteristics

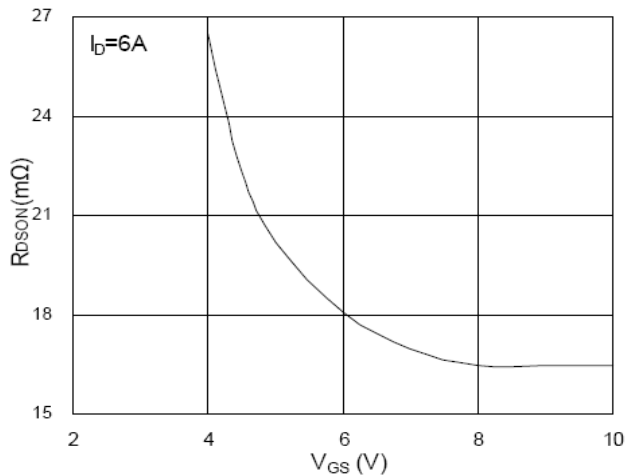


Fig.2 On-Resistance vs. Gate-Source

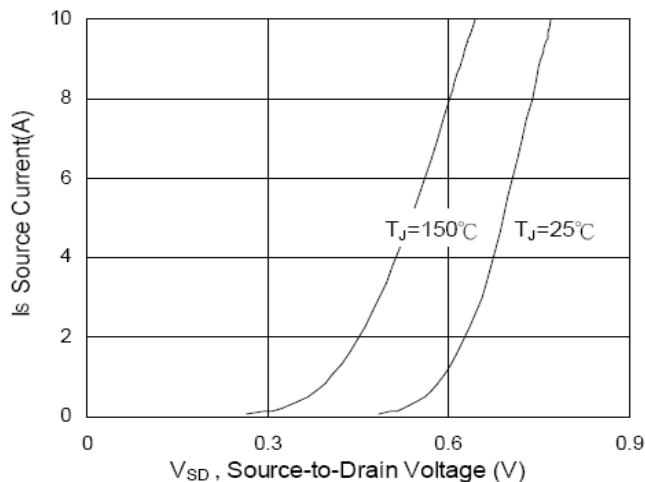


Fig.3 Forward Characteristics of Reverse

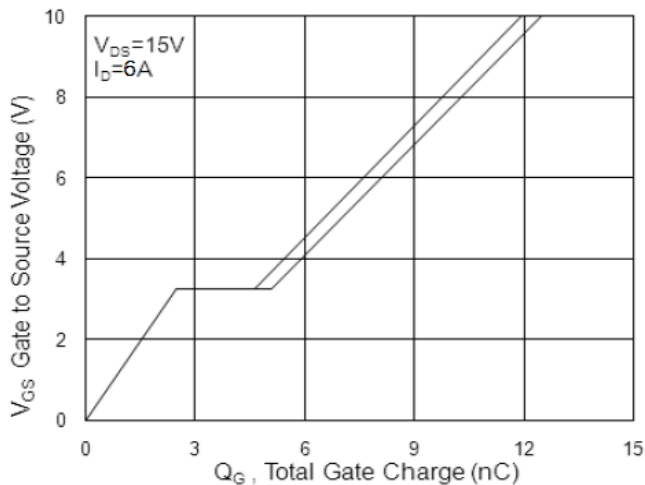


Fig.4 Gate-Charge Characteristics

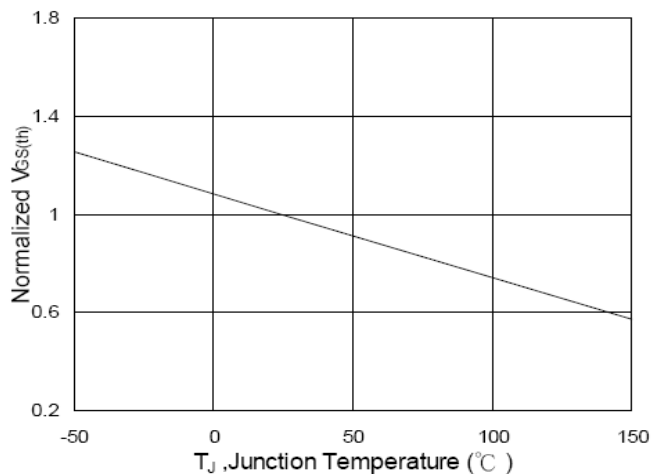


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

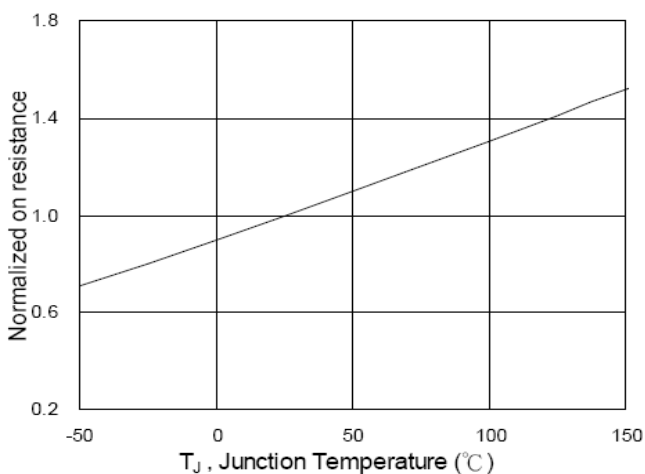


Fig.6 Normalized $R_{DS(ON)}$ vs. T_J

N-CHANNEL CHARACTERISTIC CURVE

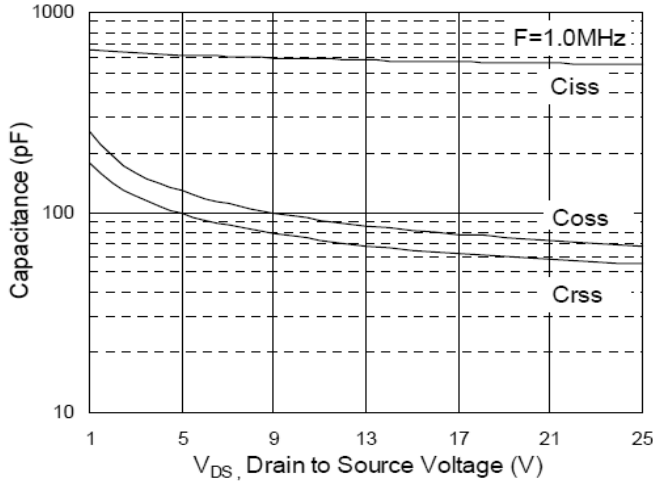


Fig.7 Capacitance

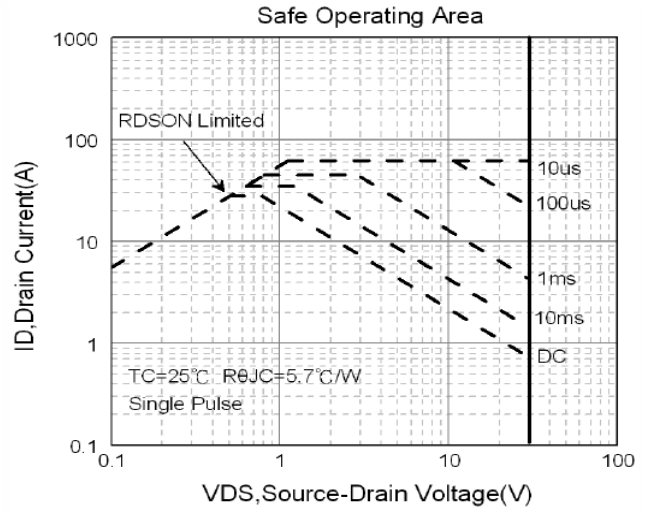


Fig.8 Safe Operating Area

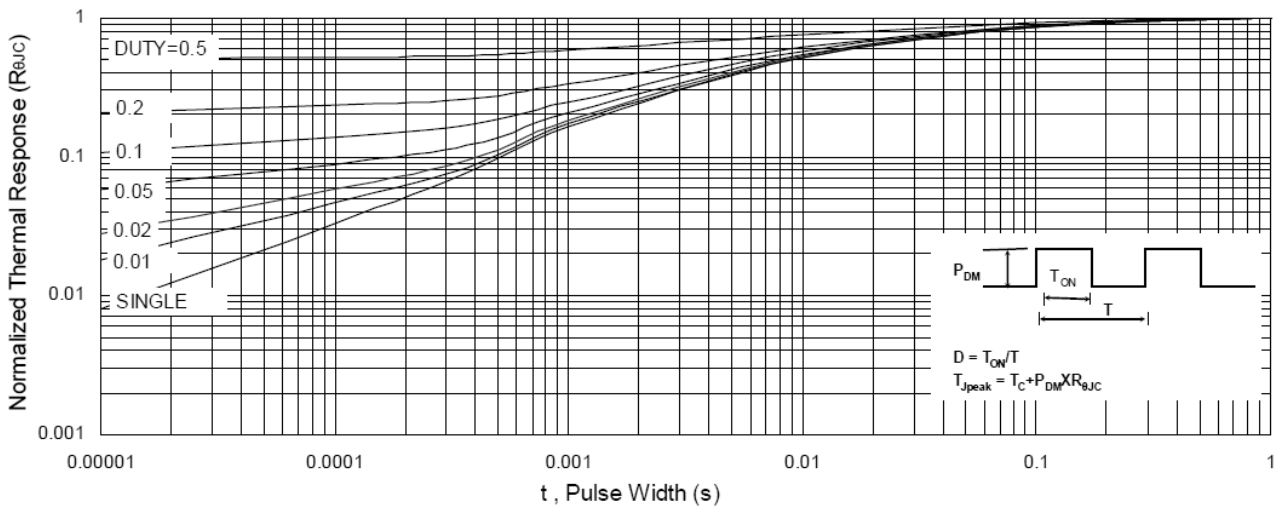


Fig.9 Normalized Maximum Transient Thermal Impedance

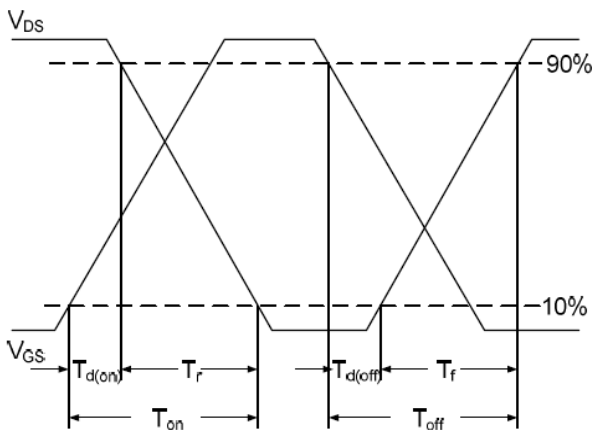


Fig.10 Switching Time Waveform

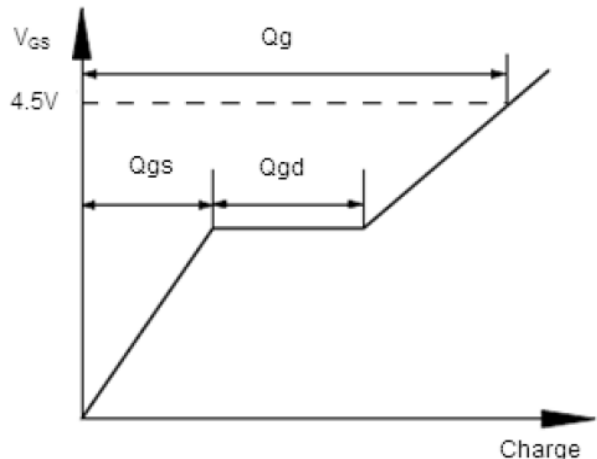


Fig.11 Gate Charge Waveform

P-CHANNEL CHARACTERISTIC CURVE

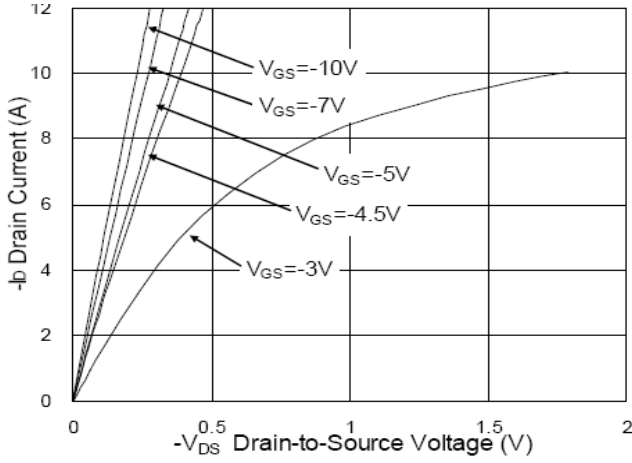


Fig.1 Typical Output Characteristics

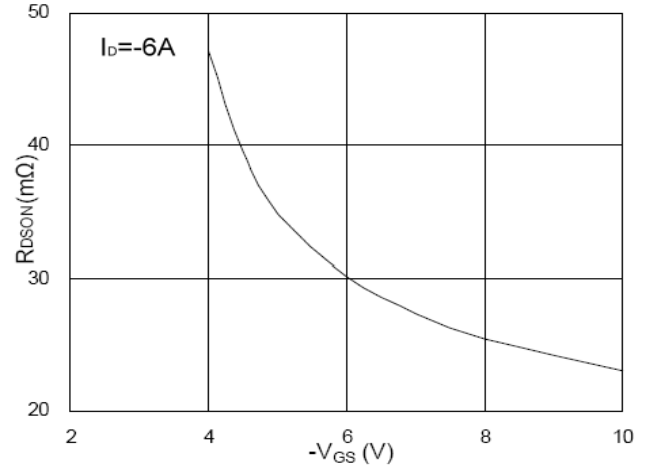


Fig.2 On-Resistance v.s Gate-Source

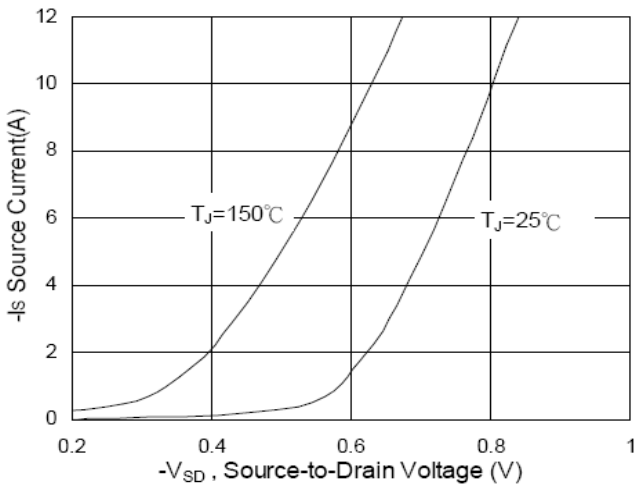


Fig.3 Forward Characteristics of Reverse

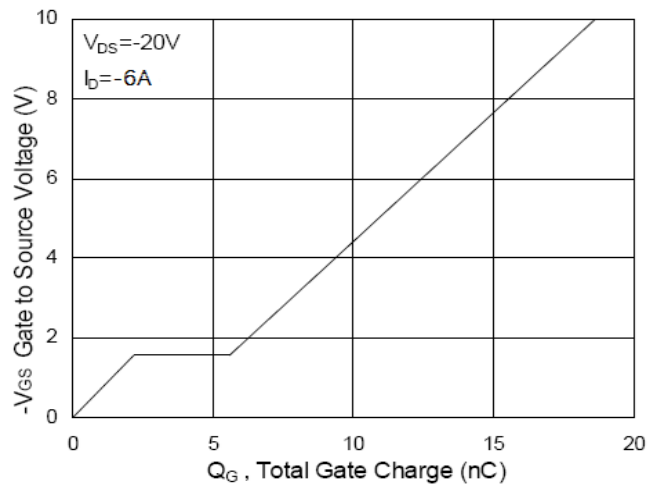


Fig.4 Gate-Charge Characteristics

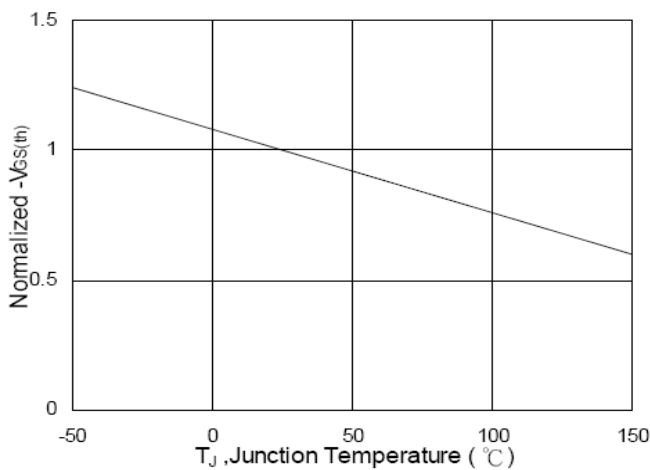


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

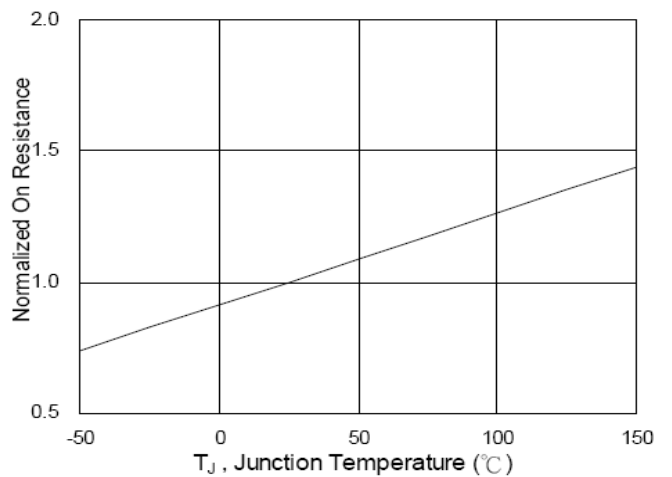


Fig.6 Normalized $R_{DS(ON)}$ v.s T_J

P-CHANNEL CHARACTERISTIC CURVE

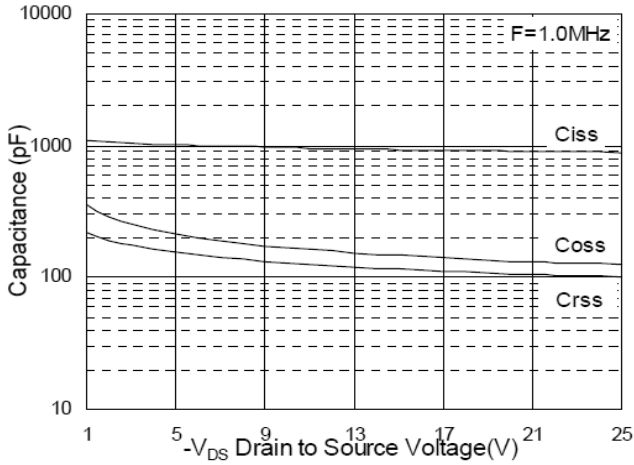


Fig.7 Capacitance

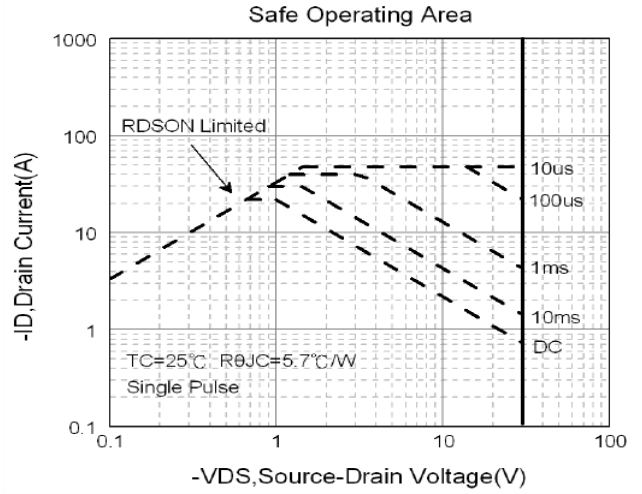


Fig.8 Safe Operating Area

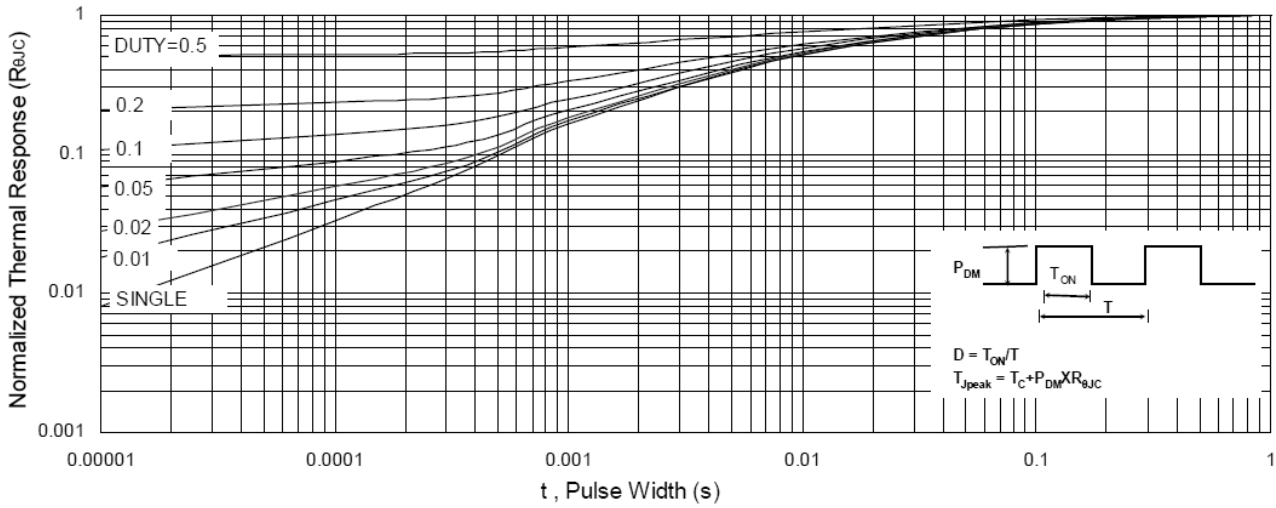


Fig.9 Normalized Maximum Transient Thermal Impedance

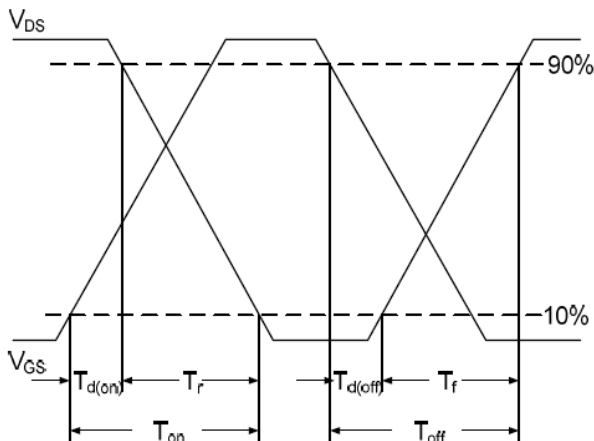


Fig.10 Switching Time Waveform

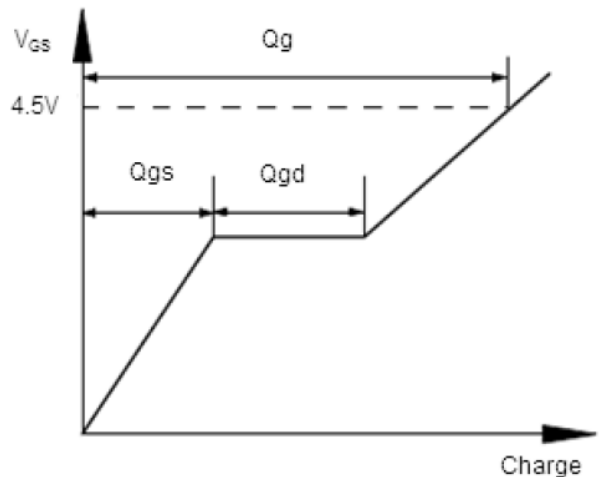


Fig.11 Gate Charge Waveform