Elektronische Bauelemente

SSDF9504

23A, 40V, $R_{DS(ON)}$ 26mΩ
-20A, -40V, $R_{DS(ON)}$ 40mΩ
N And P-Channel Enhancement Mode Power MOSFET

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

DESCRIPTION

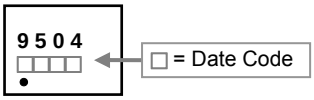
The SSDF9504 provide the designer with best combination of fast switching, low on-resistance and cost effectiveness.

The SSDF9504 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

FEATURES

- Low Gate Charge
- Low On-resistance

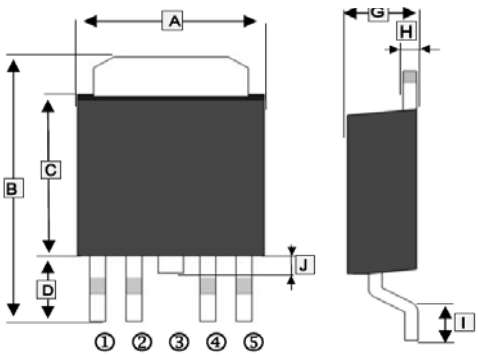
MARKING CODE



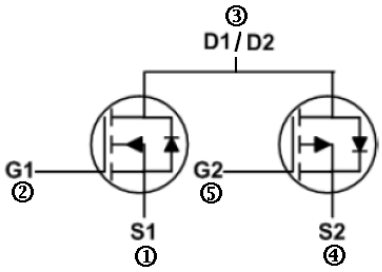
PACKAGE INFORMATION

Package	MPQ	Leader Size
TO-252-4L	2.5K	13 inch

TO-252-4L



REF.	Millimeter Min.	Millimeter Max.	REF.	Millimeter Min.	Millimeter Max.
A	6.4	6.8	F	0.4	0.6
B	9.4	10.2	G	2.2	2.4
C	5.4	5.8	H	0.45	0.55
D	2.4	3.0	I	1.4	1.8
E	1.27 REF.		J	0.8	1.2



ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise specified)

Parameter		Symbol	Ratings N-Channel	Ratings P-Channel	Unit
Drain-Source Voltage		V_{DS}	40	-40	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current @ V_{GS}=10V [1]	T_A=25°C	I_D	23	-20	A
	T_A=100°C		18	-16	
Pulsed Drain Current [2]		I_{DM}	45	-44	A
Single Pulse Avalanche Energy [3]		E_{AS}	28	66	mJ
Avalanche Current		I_{AS}	17.8	-27.2	A
Power Dissipation [4]		P_D	25		W
Maximum Junction to Ambient [1]		$R_{\theta JA}$	62		°C / W
Maximum Junction to Case [1]		$R_{\theta JC}$	5		°C / W
Operating Junction & Storage Temperature Range		T_J, T_{STG}	-55~150		°C

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

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static							
Drain-Source Breakdown Voltage	N-Ch	BV_{DSS}	40	-	-	V	V_{GS}=0, I_D=250μA
	P-Ch		-40	-	-		V_{GS}=0, I_D= -250μA
Gate-Threshold Voltage	N-Ch	$V_{GS(th)}$	1	-	2.5	V	V_{DS}=V_{GS}, I_D=250μA
	P-Ch		-1	-	-2.5		V_{DS}=V_{GS}, I_D= -250μA
Forward Transconductance	N-Ch	g_{fs}	-	8	-	S	V_{DS}=5V, I_D=12A
	P-Ch		-	12.6	-		V_{DS}= -5V, I_D= -8A
Gate-Source Leakage Current	N-Ch	I_{GSS}	-	-	±100	nA	V_{GS}= ±20V
	P-Ch		-	-	±100		V_{GS}= ±20V
Drain-Source Leakage Current	N-Ch	I_{DSS}	-	-	1	μA	V_{DS}=32V, V_{GS}=0, T_J=25°C
	P-Ch		-	-	-1		V_{DS}= -32V, V_{GS}=0, T_J=25°C
	N-Ch		-	-	5		V_{DS}=32V, V_{GS}=0, T_J=55°C
	P-Ch		-	-	-5		V_{DS}= -32V, V_{GS}=0 , T_J=55°C
Drain-Source On-Resistance [2]	N-Ch	$R_{DS(ON)}$	-	-	26	mΩ	V_{GS}=10V, I_D=6A
	P-Ch		-	-	40		V_{GS}= -10V, I_D= -6A
	N-Ch		-	-	35		V_{GS}=4.5V, I_D=4A
	P-Ch		-	-	65		V_{GS}= -4.5V, I_D= -4A
Total Gate Charge	N-Ch	Q_g	-	5.5	-	nC	N-Channel V_{DS}=20V, V_{GS}=4.5V, I_D=12A P-Channel V_{DS}= -20V, V_{GS}= -4.5V, I_D= -12A
	P-Ch		-	9	-		
Gate-Source Charge	N-Ch	Q_{gs}	-	1.25	-		
	P-Ch		-	2.54	-		
Gate-Drain (“Miller”) Charge	N-Ch	Q_{gd}	-	2.5	-		
	P-Ch		-	3.1	-		
Turn-on Delay Time	N-Ch	$T_{d(on)}$	-	8.9	-	nS	N-Channel V_{DD}=20V, R_G=3.3Ω,R_D=20Ω V_{GS}=10V, I_D=1A P-Channel V_{DD}= -15V, R_G=3.3Ω, R_D=20Ω V_{GS}= -10V, I_D= -1A
	P-Ch		-	19.2	-		
Rise Time	N-Ch	T_r	-	2.2	-		
	P-Ch		-	12.8	-		
Turn-off Delay Time	N-Ch	$T_{d(off)}$	-	41	-		
	P-Ch		-	48.6	-		
Fall Time	N-Ch	T_f	-	2.7	-		
	P-Ch		-	4.6	-		
Input Capacitance	N-Ch	C_{iss}	-	593	-	pF	N-Channel V_{GS}=0, V_{DS}=15V, f=1.0MHz P-Channel V_{GS}=0, V_{DS}= -15V, f=1.0MHz
	P-Ch		-	1004	-		
Output Capacitance	N-Ch	C_{oss}	-	76	-		
	P-Ch		-	108	-		
Reverse Transfer Capacitance	N-Ch	C_{rss}	-	56	-		
	P-Ch		-	80	-		
Gate Resistance	N-Ch	R_g	-	2.6	5.2	Ω	V_{DS}=V_{GS}=0, f=1.0MHz
	P-Ch		-	13	16		

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

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Guaranteed Avalanche Chatacteristics							
Single Pulse Avalanche Energy [5]	N-Ch	E_{AS}	9	-	-	mJ	V_{DD}=25V, L=0.1mH, I_{AS}=10A
	P-Ch		20	-	-		V_{DD}= -25V, L=0.1mH, I_{AS}= -15A
Source-Drain Diode							
Forward On Voltage[2]	N-Ch	V_{SD}	-	-	1.2	V	I_S=1A, V_{GS}=0, T_J=25°C
	P-Ch		-	-	-1		I_S= -1A, V_{GS}=0, T_J=25°C
Continuous Source Current [1,6]	N-Ch	I_S	-	-	23	A	V_D=V_G=0, Force Current
	P-Ch		-	-	-20		
Pulsed Source Current [2,6]	N-Ch	I_{SM}	-	-	45	A	
	P-Ch		-	-	-44		

Notes:
1 Surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2 Pulse width≦300μs, duty cycle≦2%.
3 The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1mH,IAS=17.8A
4 .The power dissipation is limited by 150 ℃junction temperature
5 The Min. value is 100% EAS tested guarantee.
6 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

CHARACTERISTICS CURVE (N-Channel)

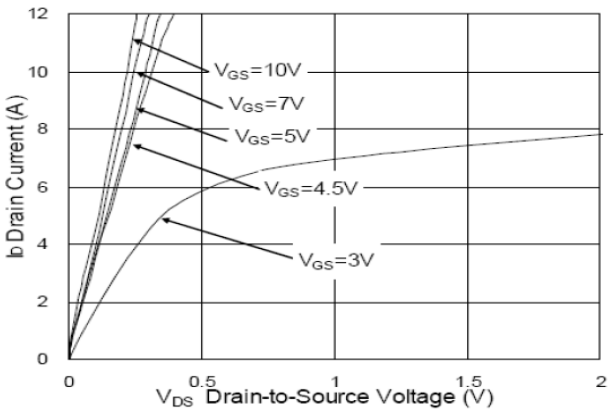


Fig.1 Typical Output Characteristics

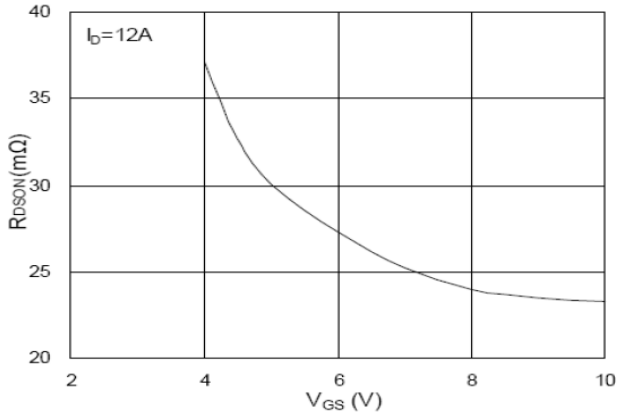


Fig.2 On-Resistance vs. G-S Voltage

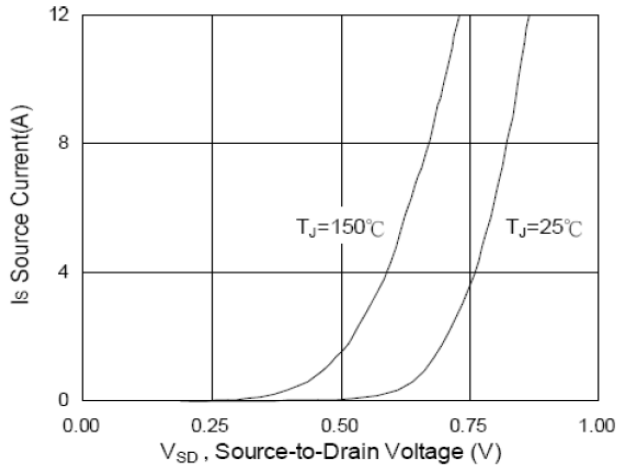


Fig.3 Forward Characteristics of Reverse

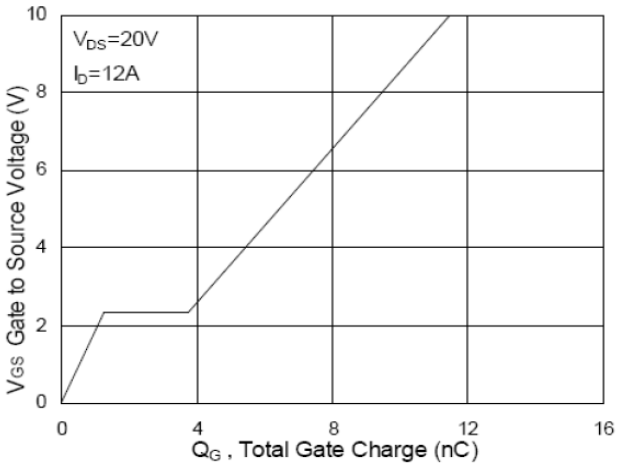


Fig.4 Gate-Charge Characteristics

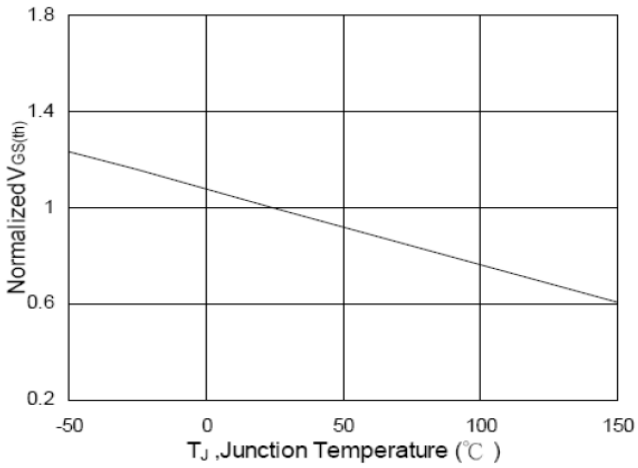


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

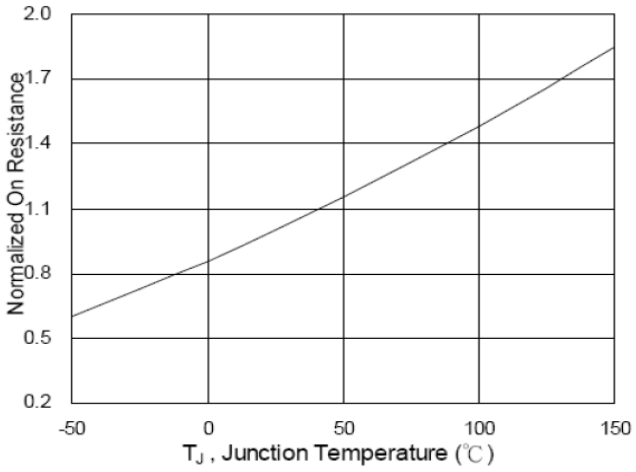


Fig.6 Normalized R_{DSON} vs. T_J

CHARACTERISTICS CURVE (N-Channel)

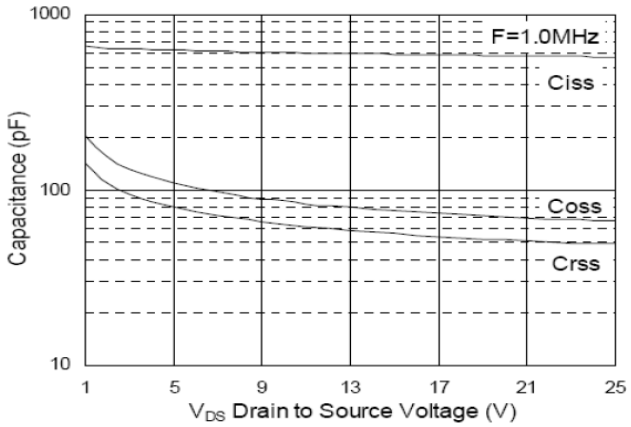


Fig.7 Capacitance

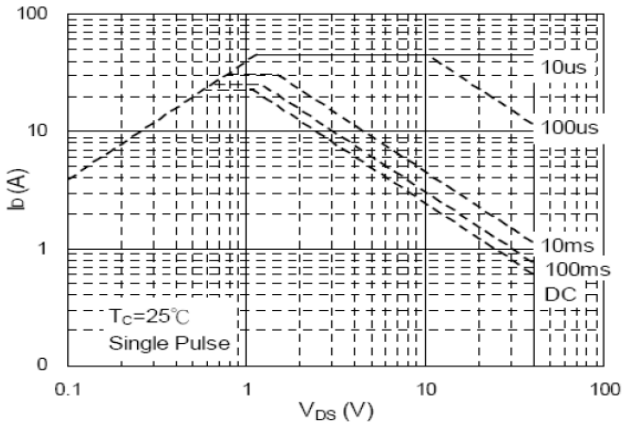


Fig.8 Safe Operating Area

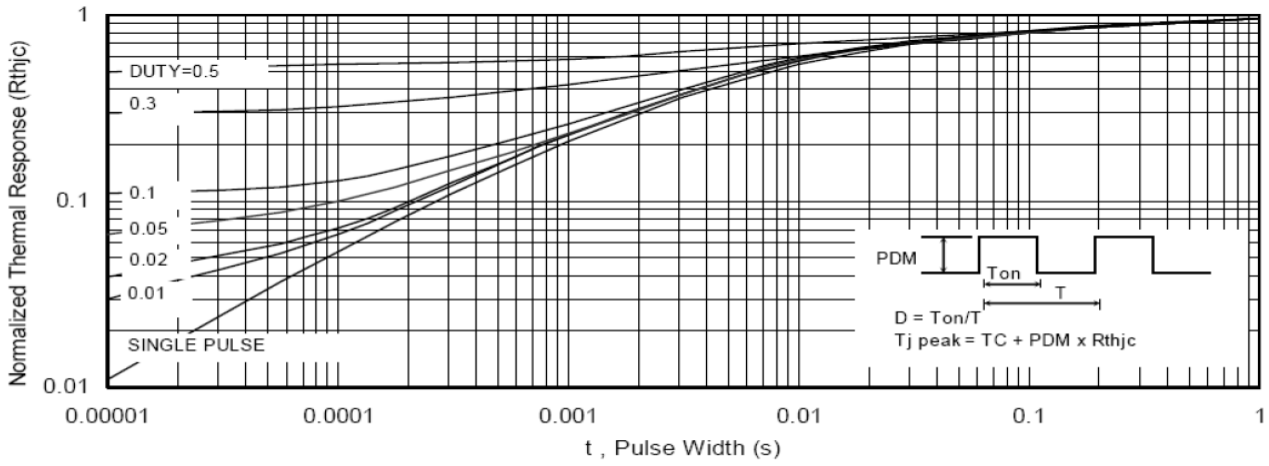


Fig.9 Normalized Maximum Transient Thermal Impedance

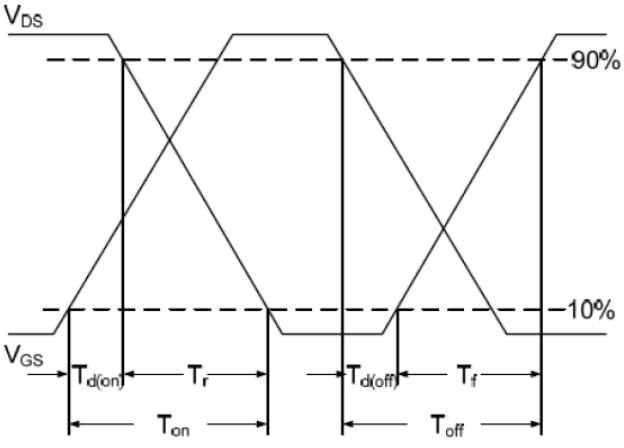


Fig.10 Switching Time Waveform

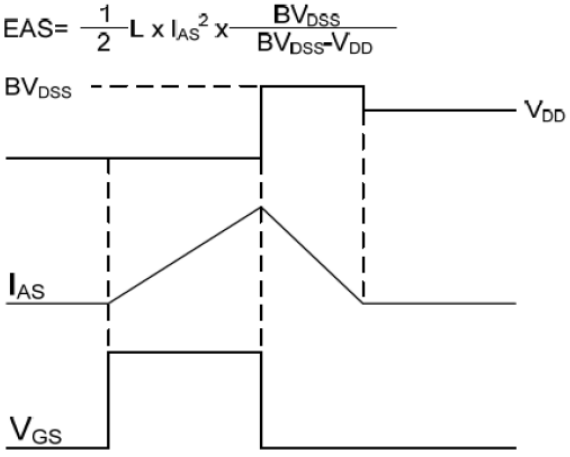


Fig.11 Unclamped Inductive Switching Wave

CHARACTERISTICS CURVE (P-Channel)

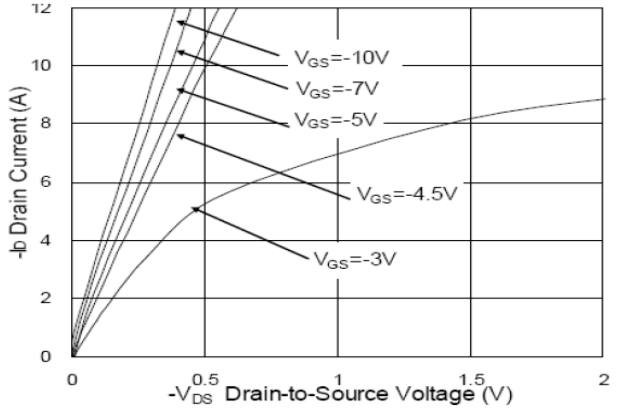


Fig.1 Typical Output Characteristics

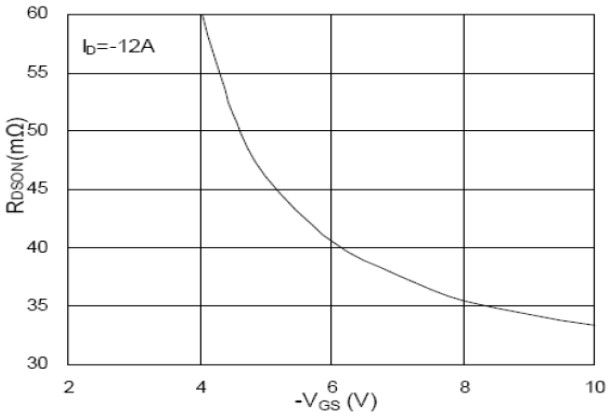


Fig.2 On-Resistance v.s Gate-Source

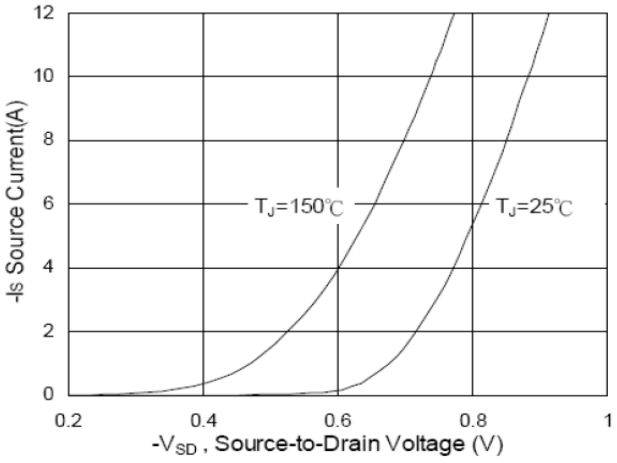


Fig.3 Forward Characteristics of Reverse

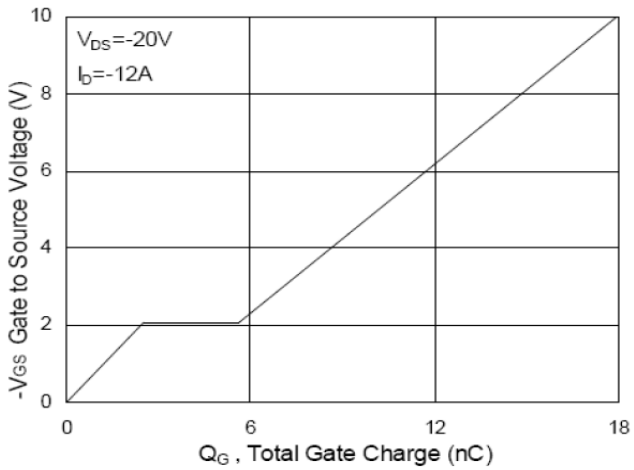


Fig.4 Gate-Charge Characteristics

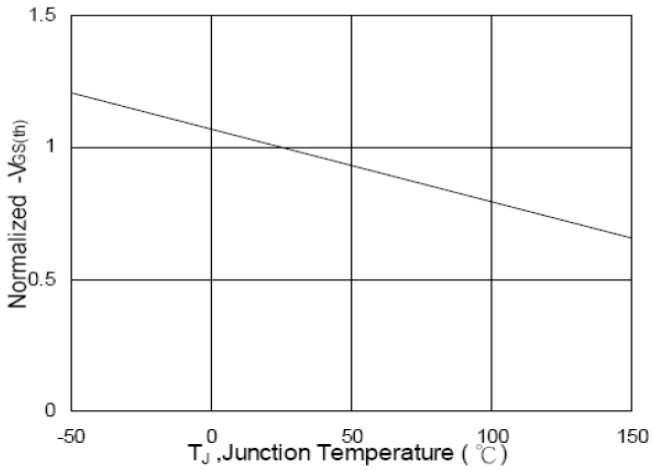


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

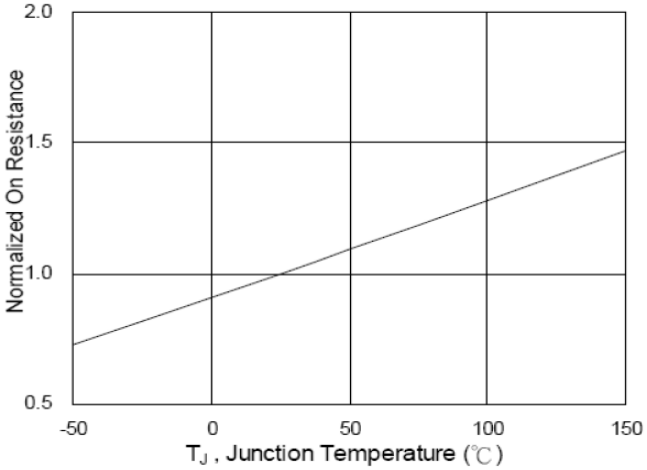


Fig.6 Normalized R_{DSON} v.s T_J

CHARACTERISTICS CURVE (P-Channel)

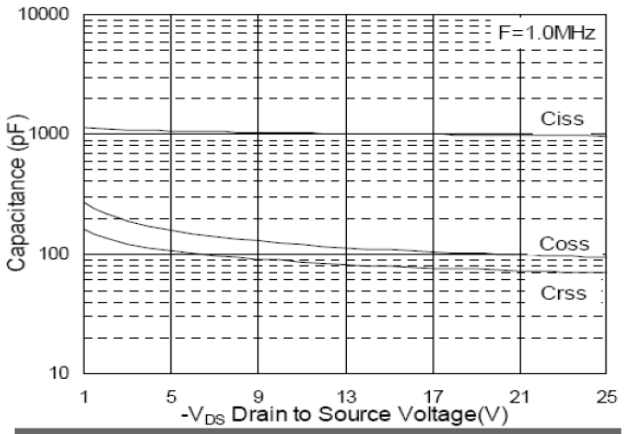


Fig.7 Capacitance

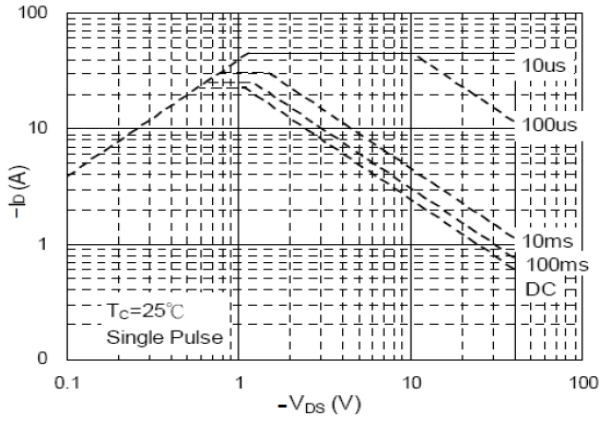
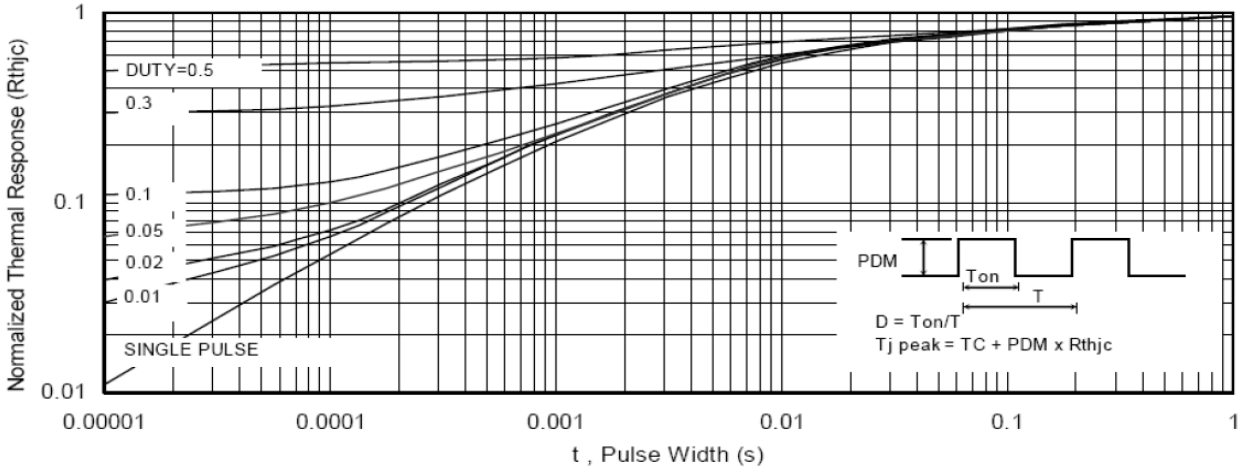


Fig.8 Safe Operating Area



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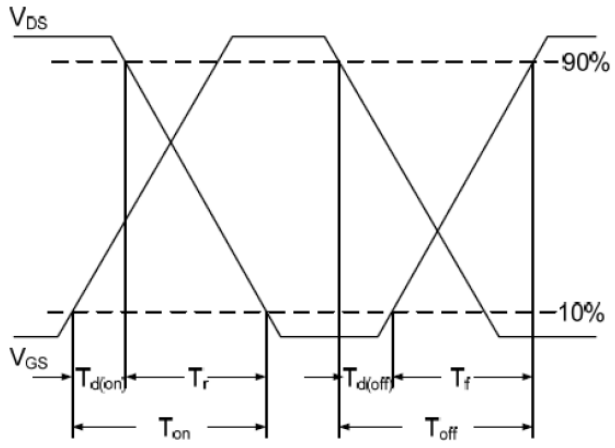

Fig.10 Switching Time Waveform

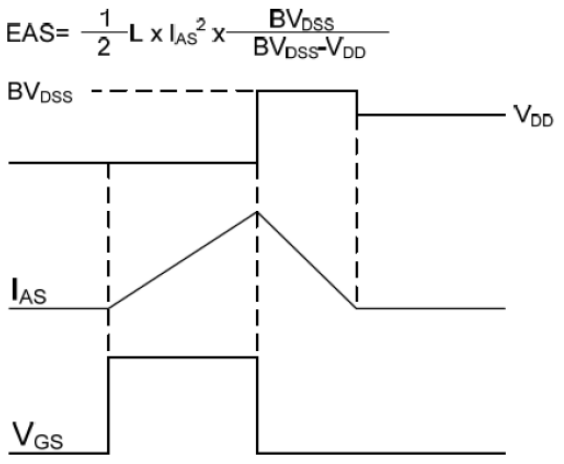

Fig.11 Unclamped Inductive Switching Wave