1200V/40A/80mΩ Silicon Carbide Power MOSFET

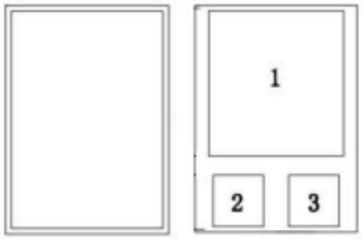
Features

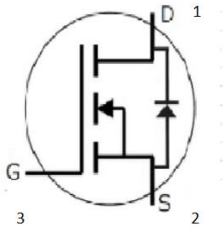
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capactiances
- Easy to parallel and simple to drive
- Avanche Ruggedness

Key Characteristics		
V_{DS}	1200	V
I_D, T_C = 25˚C	40	A
$R_{DS(on)}$	80	mΩ

Benefits

- Very tight variation of on-resistance vs. temperature
- Very fast and robust intrinsic body diode
- Low capacitance
- Easy to drive





Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
  - Battery Chargers
- Motor Drives
- Pulsed Power applications

Part No.	Package Type	Marking
G1M080120S	SMD1.0	G1M080120S

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Maximum Ratings

Parameter	Symbol	Test Condition	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS} = 0 V, I_D = 100 μA	1200	V
Gate - Source Voltage	V_{GSmax}	Absolute maximum values	-10/+25	V
Gate - Source Voltage	V_{GSop}	Recommended operational values	-5/+20	V
Continuous Drain Current	I_D	V_{GS} = 20 V, T_C = 25˚C	40	A
		V_{GS} = 20 V, T_C = 100˚C	25.4	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	160	A
Power Dissipation	P_D	T_C=25℃， T_J=150℃	237	W
Operating Junction and Storage Temperature	T_j, T_{stg}		-55 to +220	℃
Solder Temperature	T_L	1.6mm (0.063”) from case for 10s	260	℃

Reverse Diode Characteristics

Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_{SD} = 10 A, Tj=25℃	-	3.25		V
Continuous Diode Forward Current	I_S	T_C=25℃		40		A
Reverse Recovery Time	trr	V_{GS}=-5V I_{SD}=20A, di/dt=100A/us V_{DD}=800V, T_J=25℃	-	67		ns
Reverse Recovery Charge	Qrr		-	46		nC
Peak Reverse Recovery Current	Irrm			-1.2		A

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Electrical Characteristics

Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	3	4		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V		1	100	μA
		V_{DS} = 1200 V, V_{GS} = 0 V, T_J=150℃		10		μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20 V, I_D = 20 A		80	100	mΩ
		V_{GS} = 20 V, I_D = 20 A, T_J=150℃		100		mΩ
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=20A		10.0		S
		V_{DS}=20V, I_{DS}=20A,T_J=150℃		10.3		
Input capacitance	C_{iss}	V_{GS} = 0 V , V_{DS}=1000V f=1MHZ , V_{AC}=25mV		1816		pF
Output capacitance	C_{oss}			142		
Reverse transfer capacitance	C_{rss}			24		
C_{OSS} Stroed Energy	E_{OSS}			71		uJ
Avalanche Energy, Single Pulse	E_{AS}	I_D=20A,V_{DD}=50V		1.08		J
Turn-on switching energy	E_{ON}	V_{DS}=800V, V_{GS} = -5/20 V I_D = 20A, $R_{G(ext)}$=6.8Ω L= 5.6mH		1.6		mJ
Turn-off switching energy	E_{OFF}			0.4		
Turn-on delay time	$T_{d(on)}$	V_{DD}=800V, V_{GS} = -5/20 V I_D = 20A, $R_{G(ext)}$=2.5Ω RL=40Ω		20		ns
Rise time	T_r			33		
Turn-off delay time	$T_{d(off)}$			21		
Fall Time	t_f			31		
Internal Gate Resistance	$R_{G(int)}$	F=1MHZ, V_{AC}=25mV		5.7		Ω
Gate to Source charge	Q_{gs}	V_{DS}=800V V_{GS} = 6/20 V I_D = 20A		26		nC
Gate to Drain charge	Q_{gd}			51		
Total gate charge	Q_g			102		

Thermal Characteristics

Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	$R_{th(JC)}$		-	0.32		℃/W

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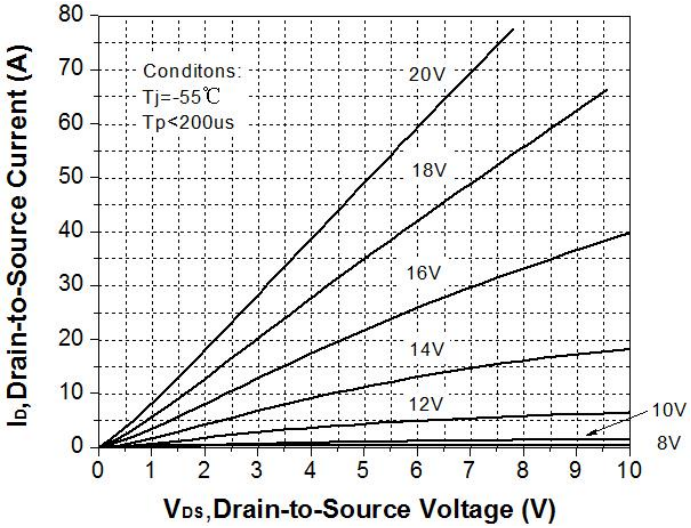
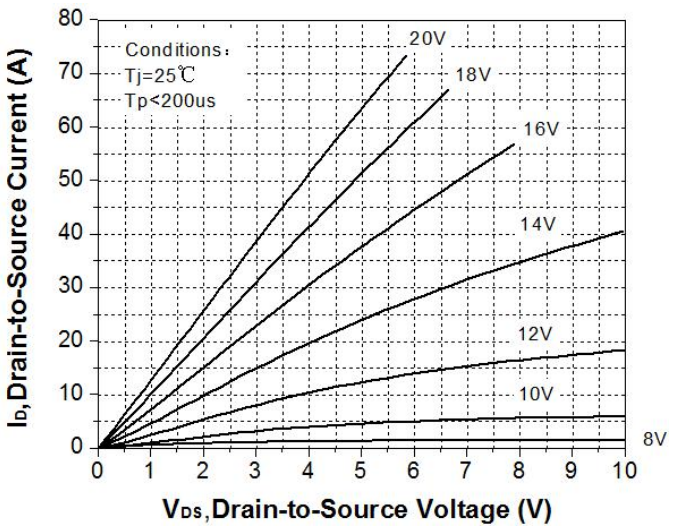
Performance Graphs

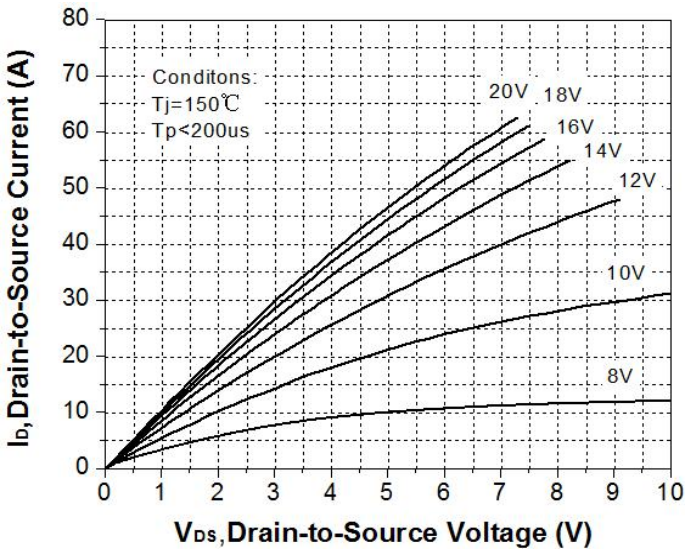
1) Output Characteristics T_J = -55 °C:



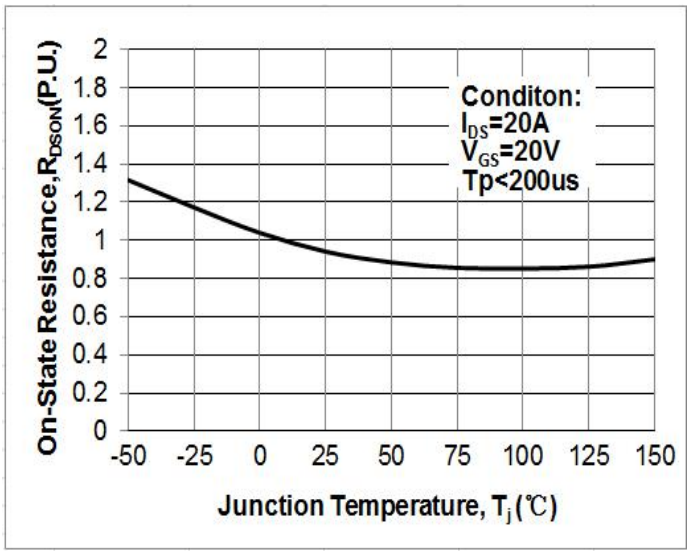
2) Output Characteristics T_J = 25 °C:



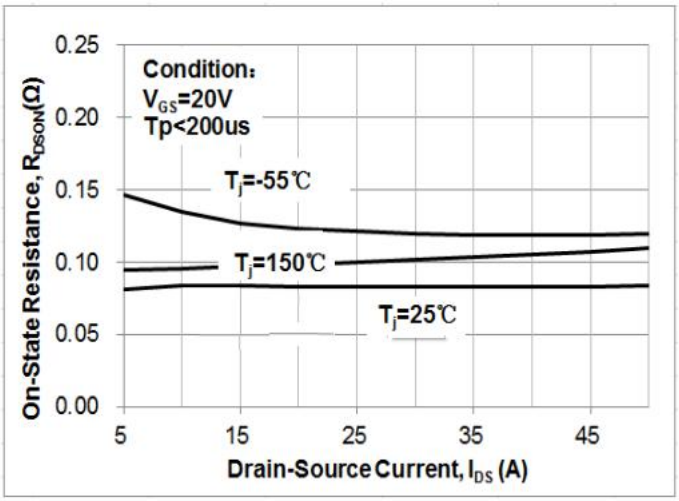
3) Output Characteristics T_J = 150 °C:



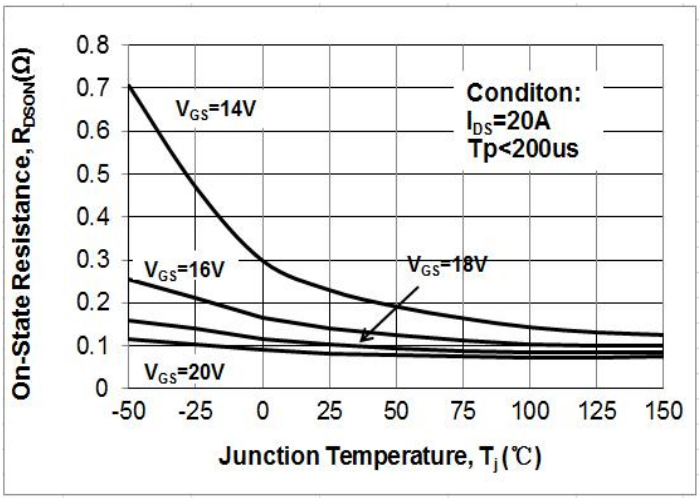
4) Normalized On-Resistance vs. Temperature



5) On-Resistance vs. Drain Current For Various Temperatures



6) On-Resistance vs. Drain Current For Various Gate Voltage



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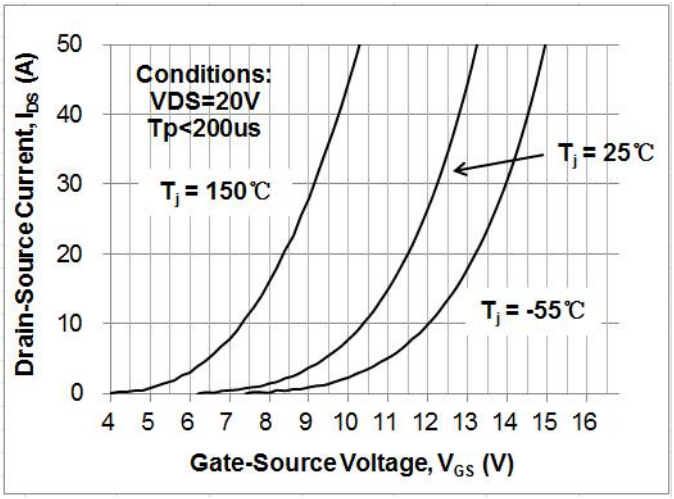
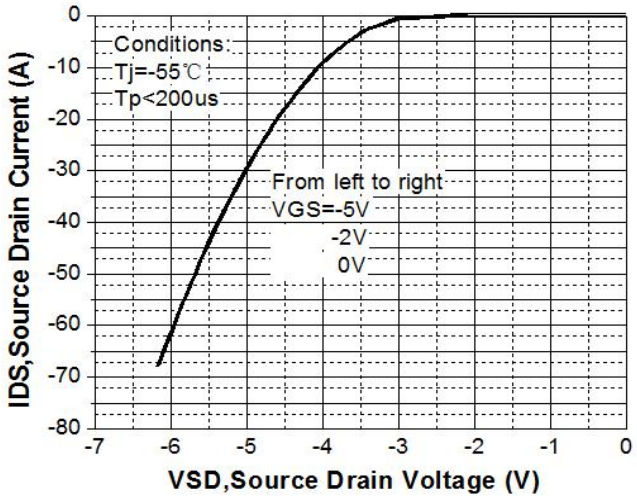
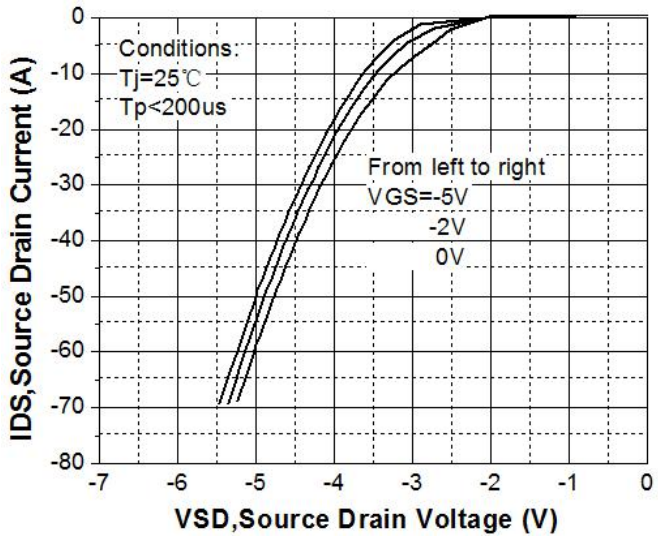
7) Transfer Characteristic for Various Junction Temperatures



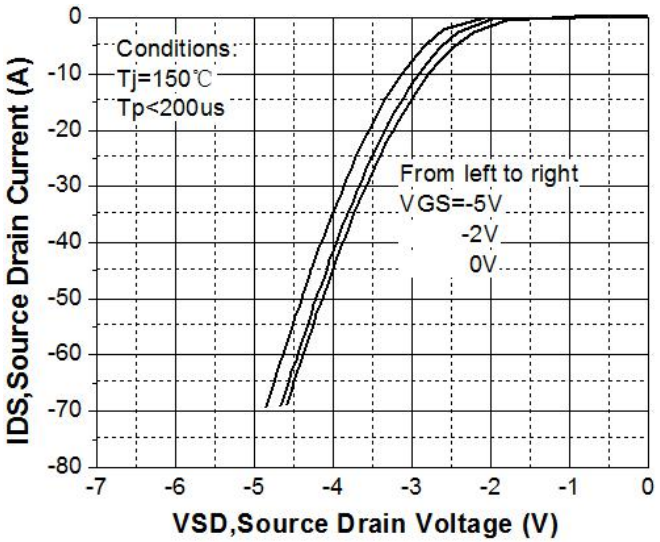
8) body Diode Characteristic at -55℃



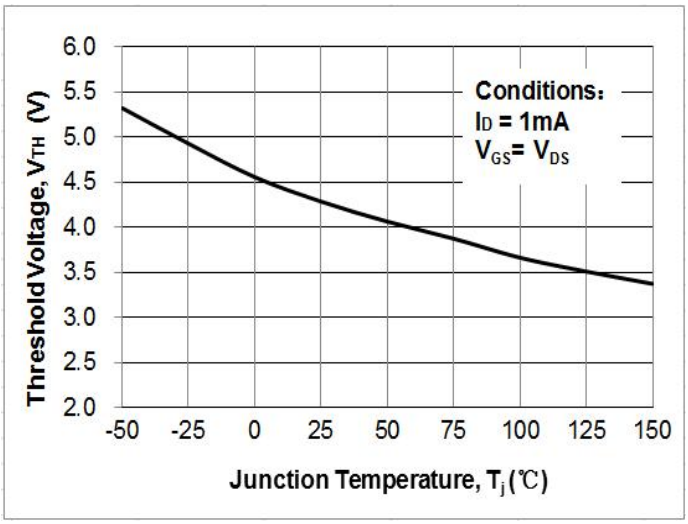
9) body Diode Characteristic at 25℃



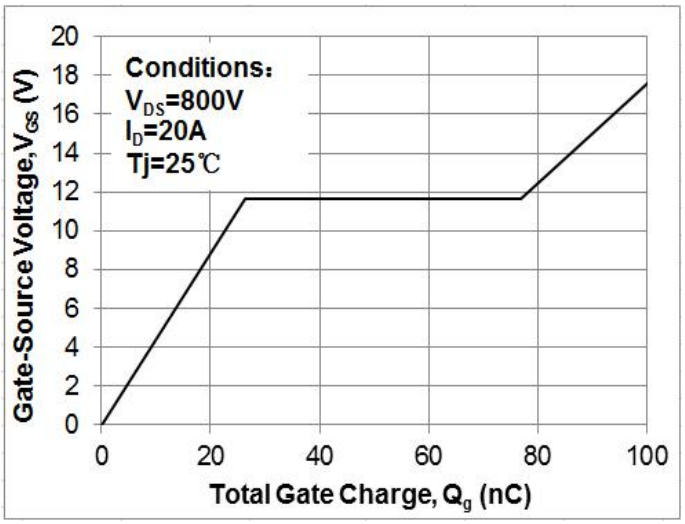
10) body Diode Characteristic at 150℃



11) Threshold Voltage vs. Temperature



12) Gate Charge Characteristics



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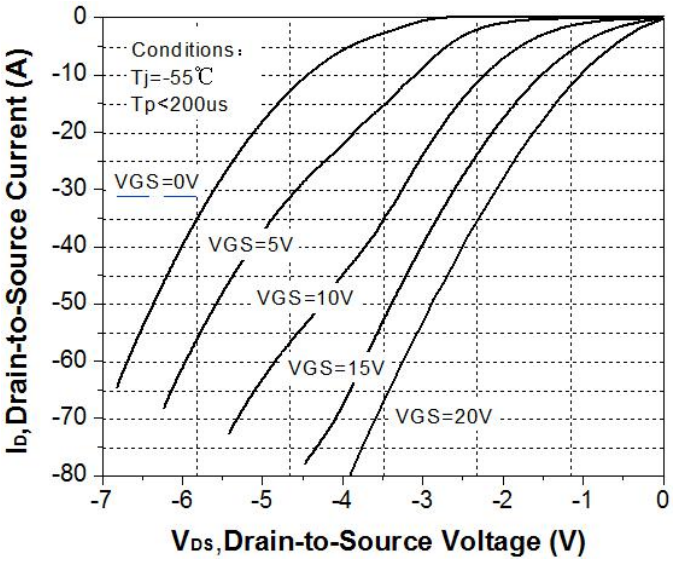
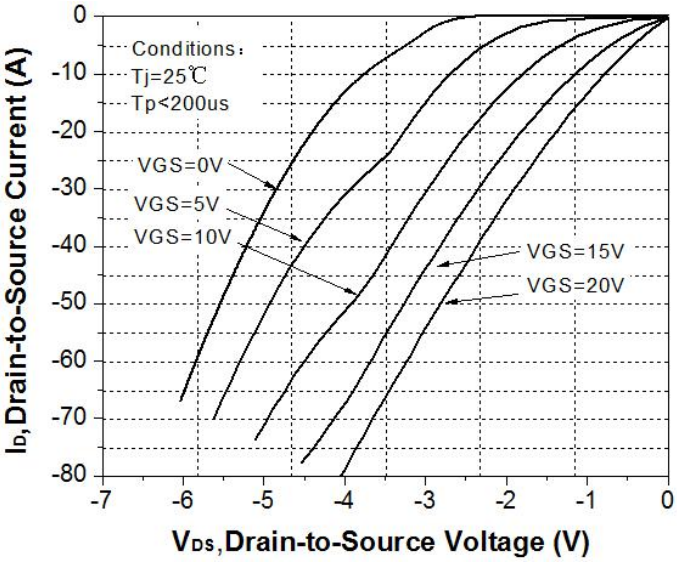
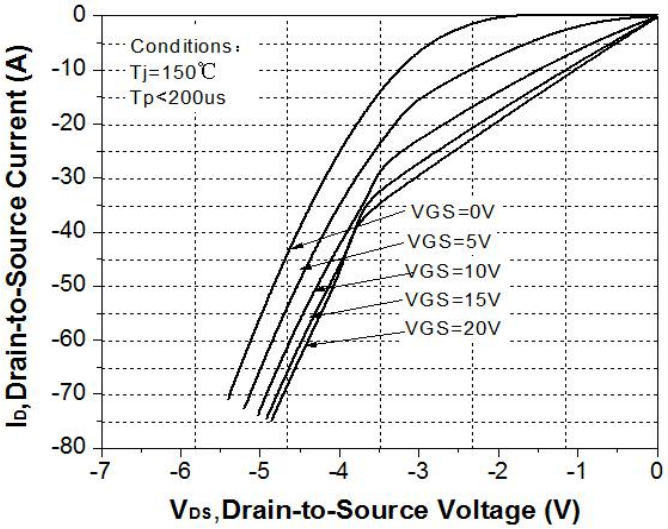
13) 3rd Quadrant Characteristic at -55℃



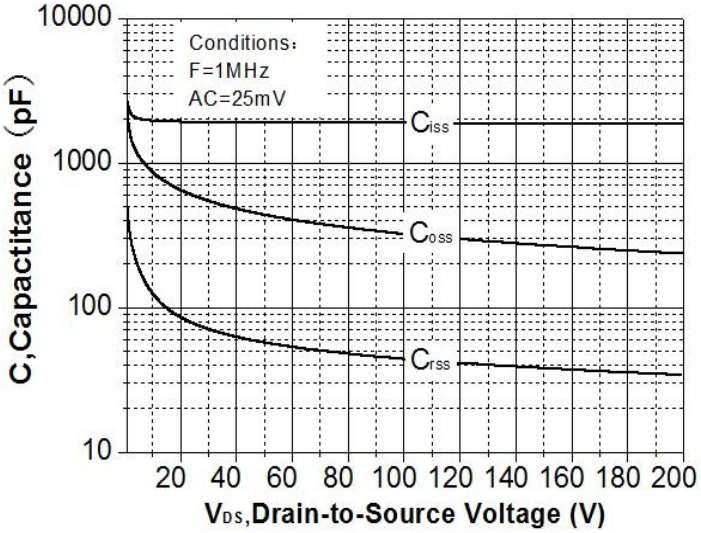
14) 3rd Quadrant Characteristic at 25℃



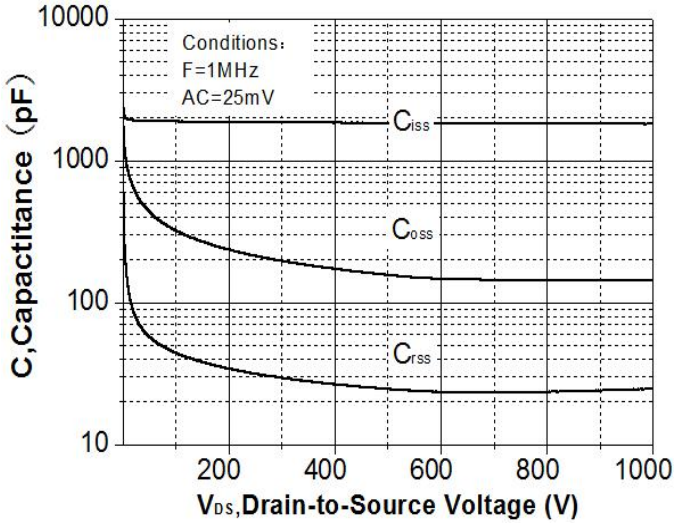
15) 3rd Quadrant Characteristic at 150℃



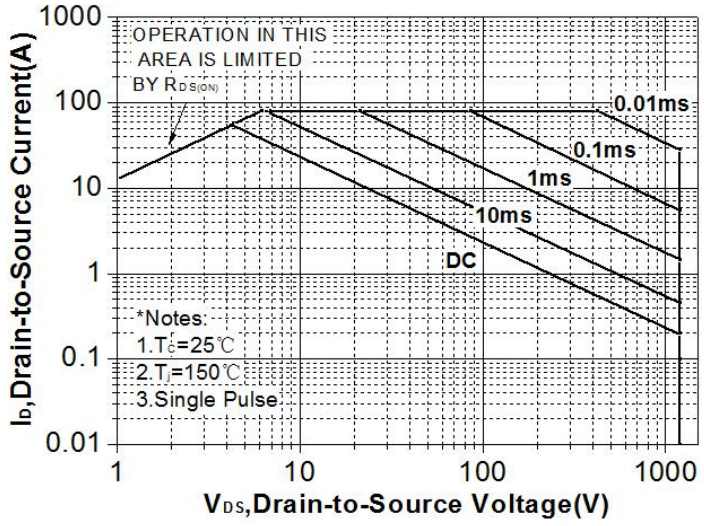
16) Capacitances vs. Drain-Source Voltage (0-200V)



17) Capacitances vs. Drain-Source Voltage (0-1000V)



18) Safe Operating Area



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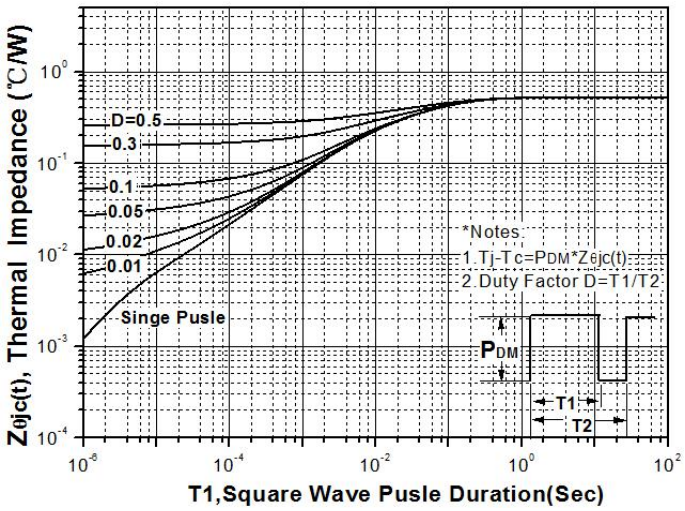
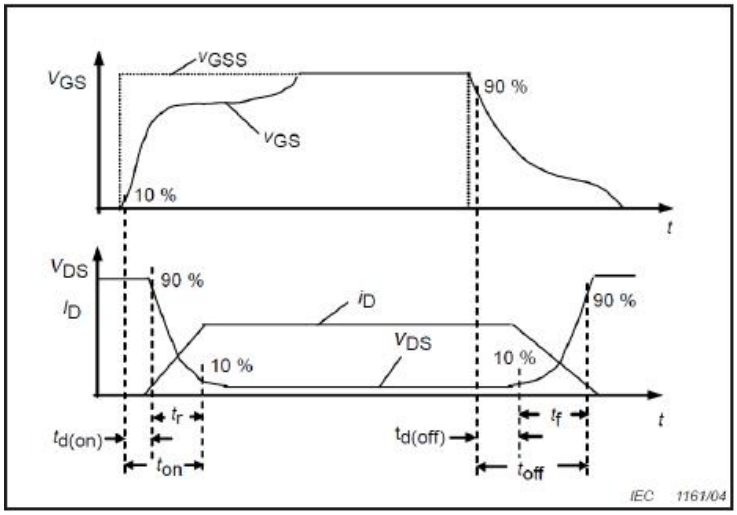
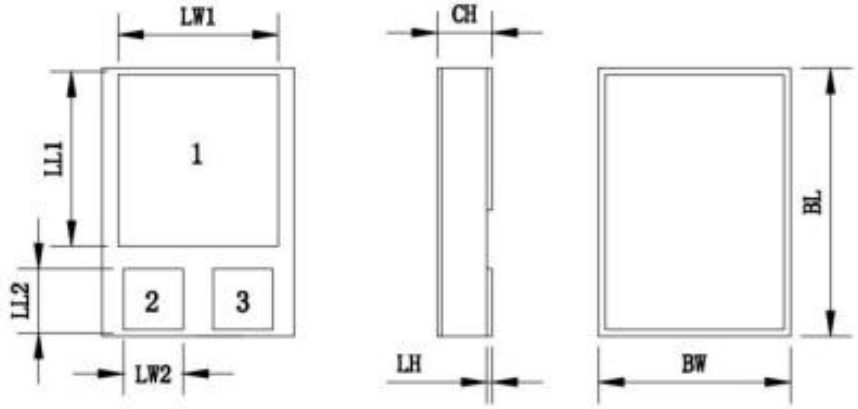
19) Transient Thermal Impedance (Junction-Case)



20) Switching Times Definition



Package SMD1.0



SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
BL	15.7	16.06	LW1	9.38	9.68
BW	11.25	11.61	LW2	3.4	3.7
CH	3.5	3.6	LL1	10.39	10.69
LH	0.17	0.43	LL2	3.85	4.15

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