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

Features

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

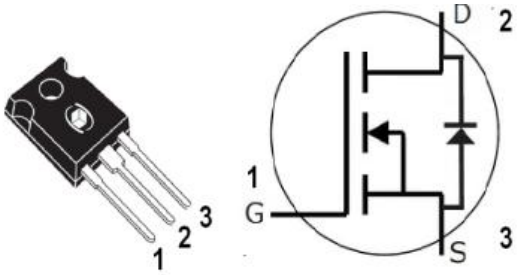
Key Characteristics		
V_{DS}	1200	V
I_D, T_C = 25˚C	40	A
$R_{DS(on)}$	80	mΩ

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
G1M080120BM	TO-247	G1M080120BM

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 +150	℃
Solder Temperature	T_L	1.6mm (0.063”) from case for 10s	260	℃
Mounting Torque	M_D	M3 or 6-32 screw	1 8.8	Nm lbf-in

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

Electrical Characteristics

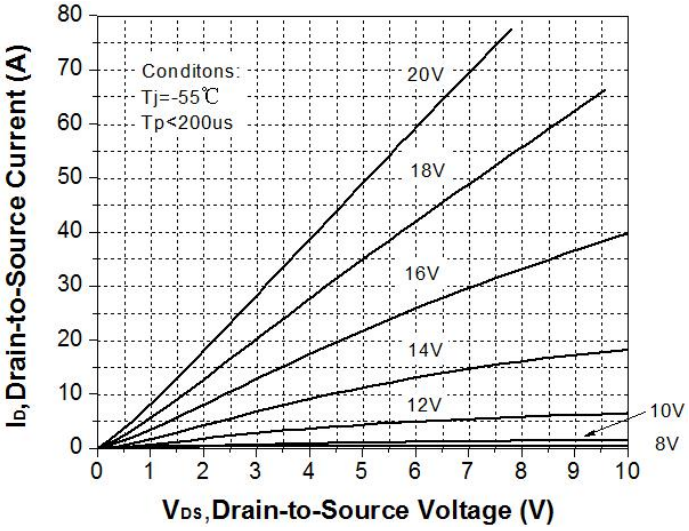
Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	3	4		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V		1	100	μA
		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, $R_{G(ext)}$=6.8 Ω 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, $R_{G(ext)}$=2.5 Ω RL=40 Ω		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

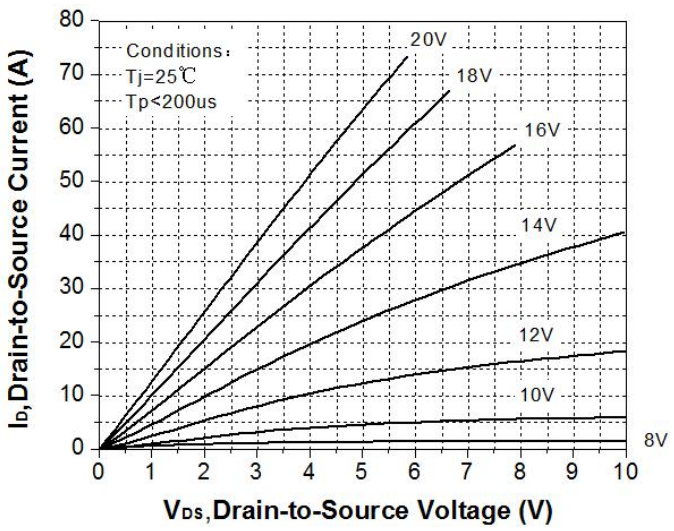
Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	$R_{th(JC)}$		-	0.53		℃/W
Thermal Resistance from Junction to Ambient	$R_{th(JA)}$		-	29.1		

Performance Graphs

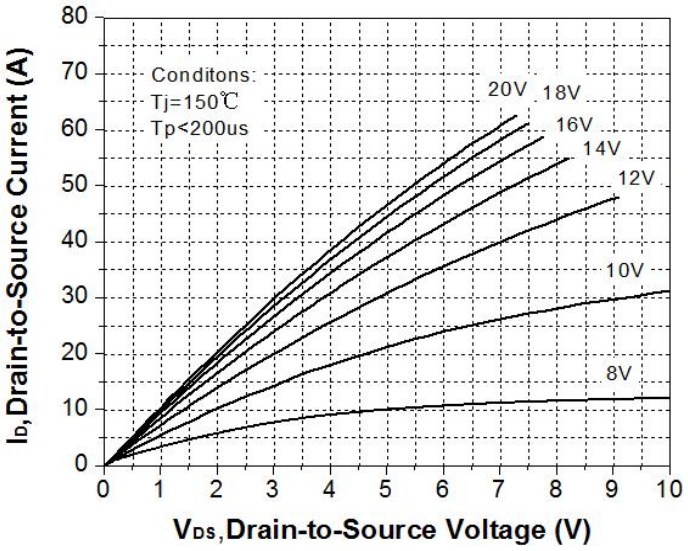
1) Output Characteristics T_J = -55 °C:



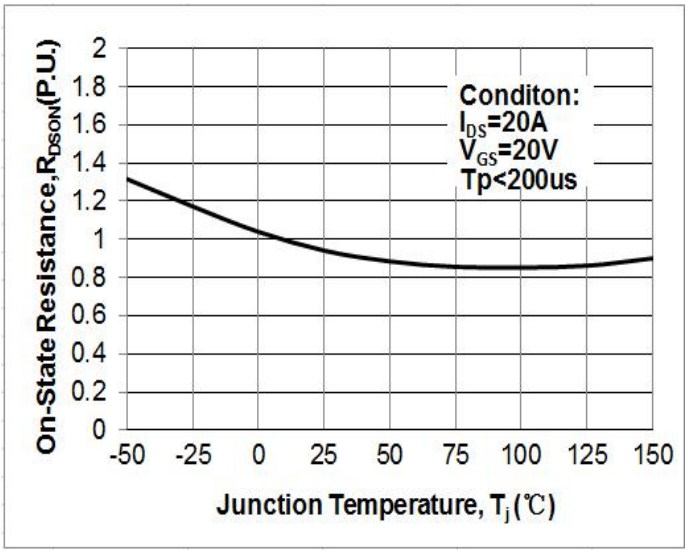
2) Output Characteristics T_J = 25 °C:



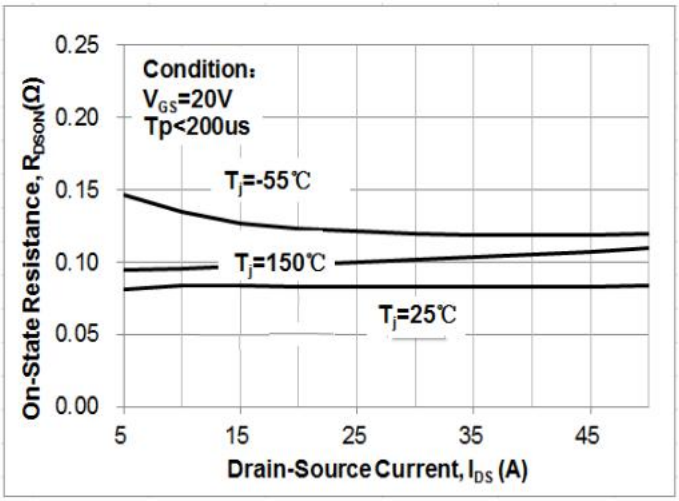
3) Output Characteristics T_J = 150 °C:



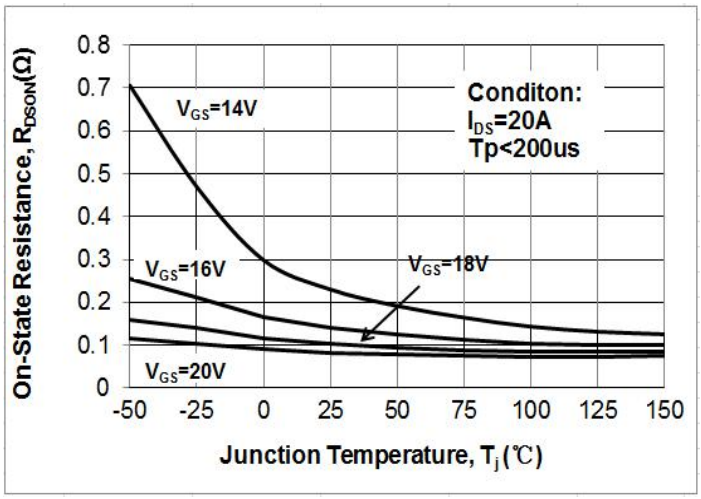
4) Normalized On-Resistance vs. Temperature



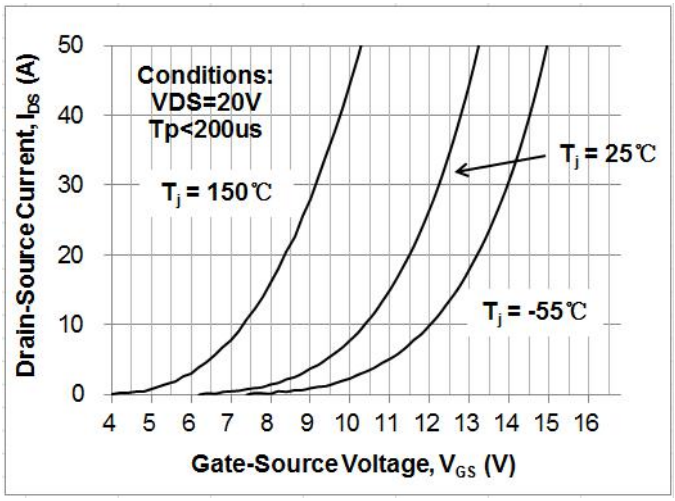
5) On-Resistance vs. Drain Current For Various Temperatures



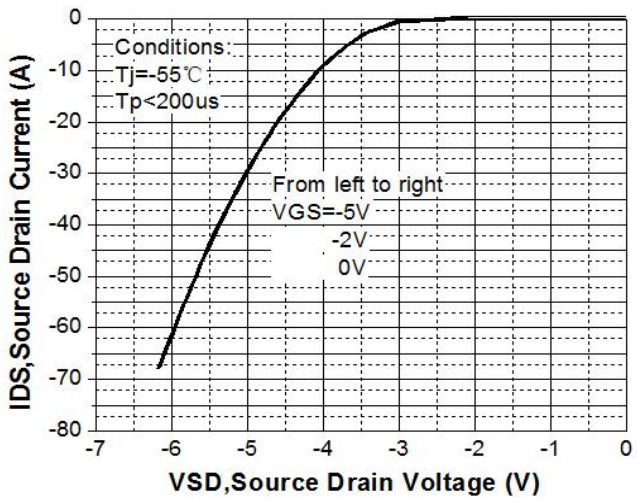
6) On-Resistance vs. Drain Current For Various Gate Voltage



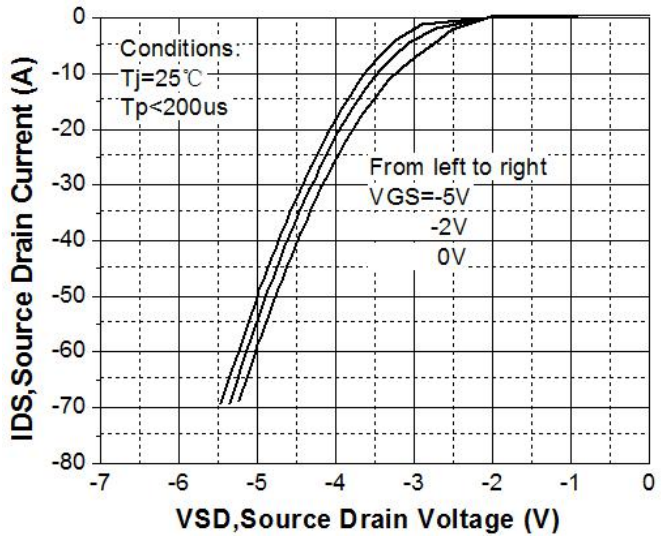
7) Transfer Characteristic for Various Junction Temperatures



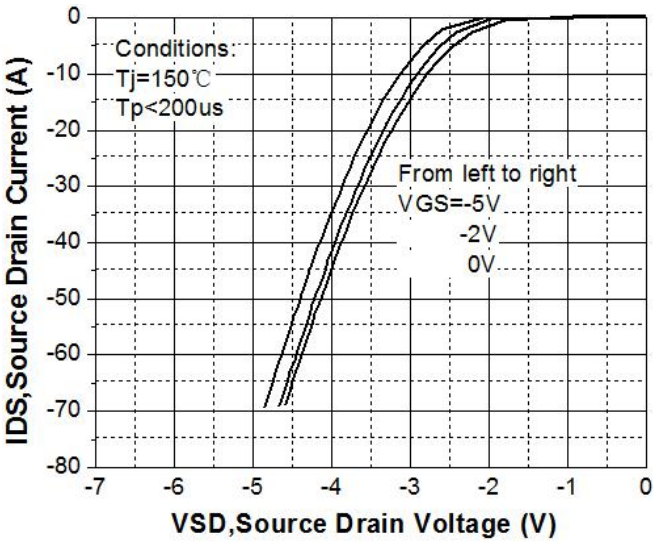
8) body Diode Characteristic at -55℃



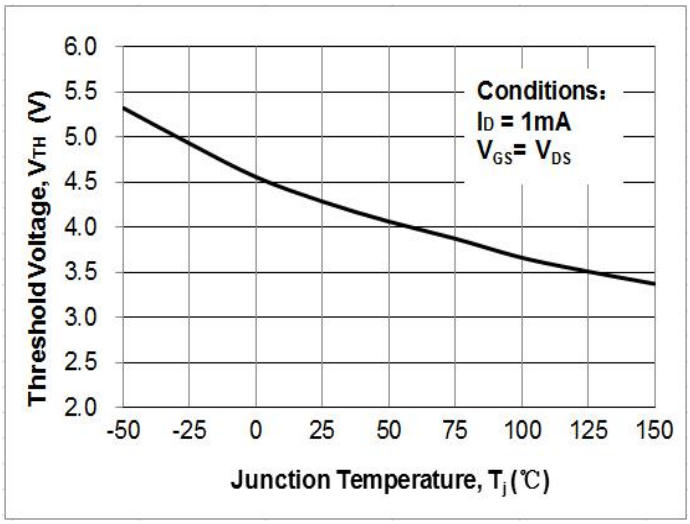
9) body Diode Characteristic at 25℃



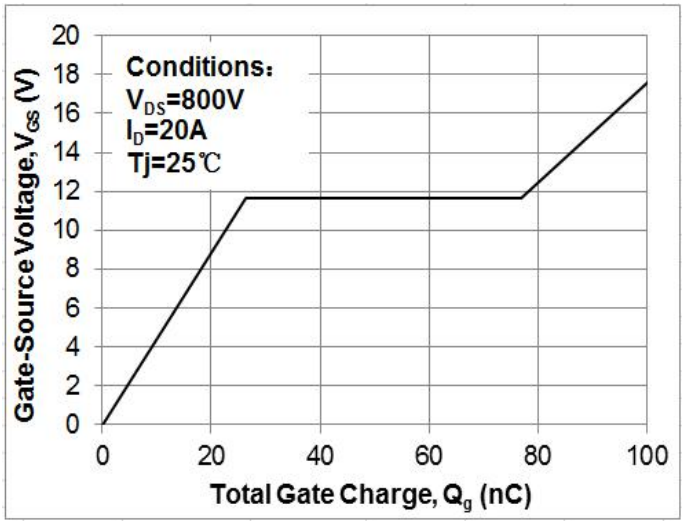
10) body Diode Characteristic at 150℃



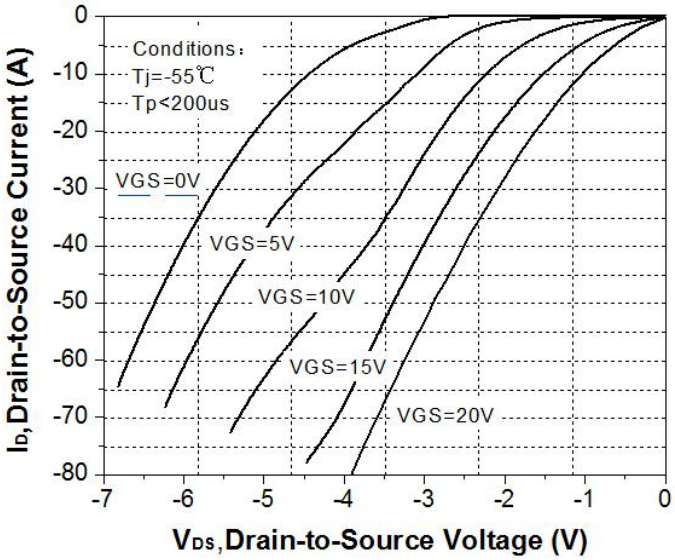
11) Threshold Voltage vs. Temperature



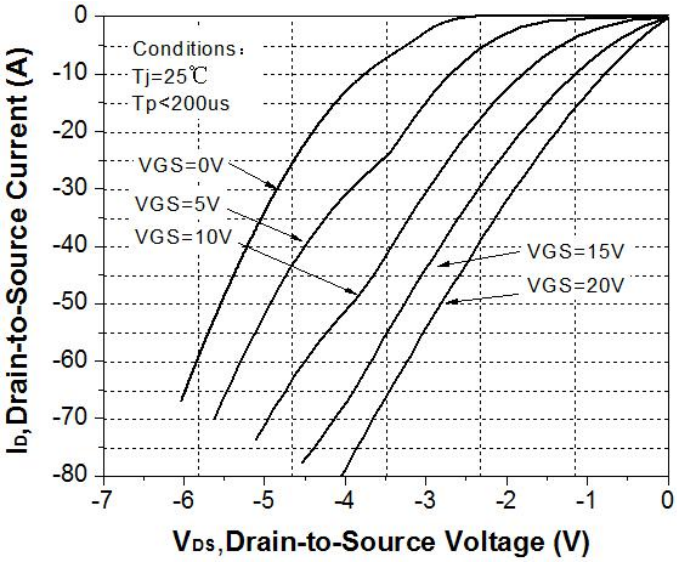
12) Gate Charge Characteristics



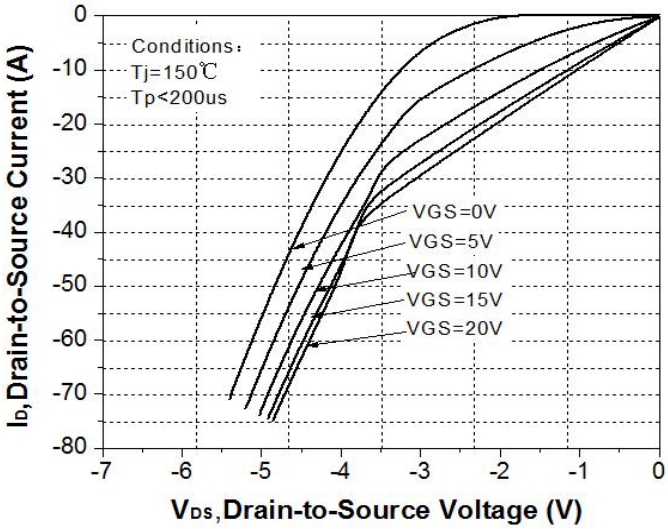
13) 3rd Quadrant Characteristic at -55℃



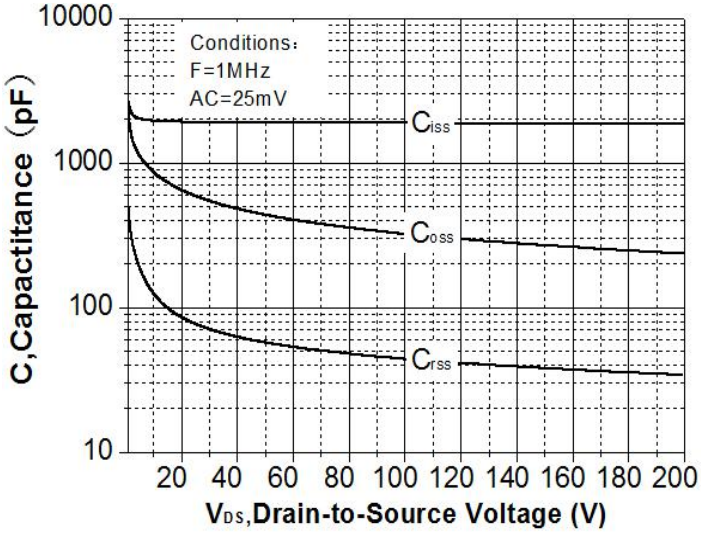
14) 3rd Quadrant Characteristic at 25℃



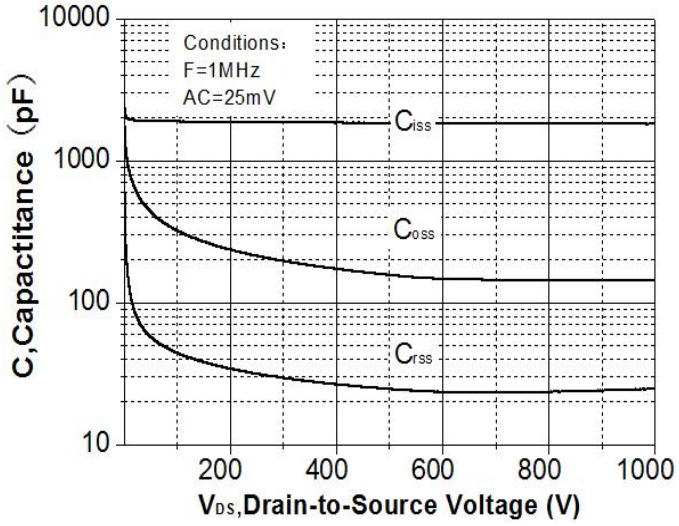
15) 3rd Quadrant Characteristic at 150℃



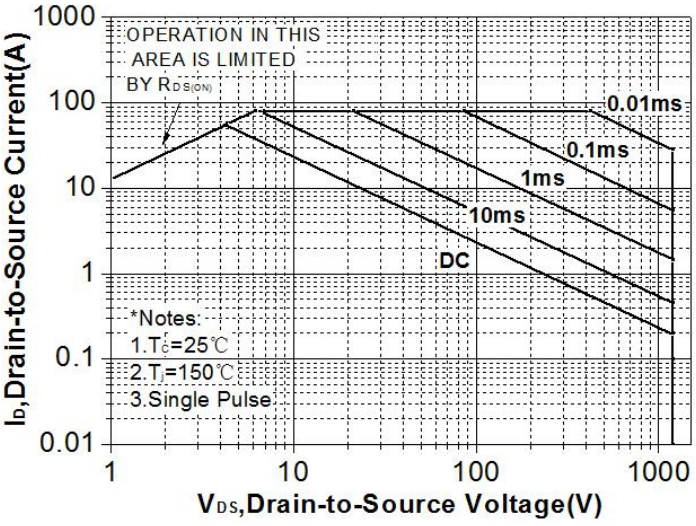
16) Capacitances vs. Drain-Source Voltage (0-200V)



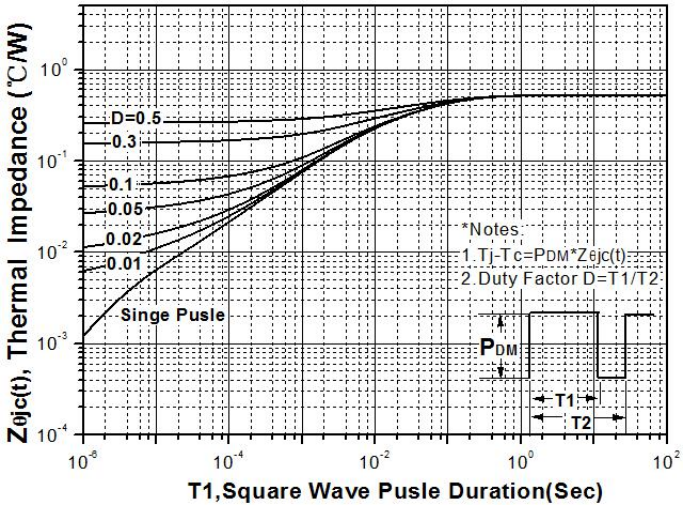
17) Capacitances vs. Drain-Source Voltage (0-1000V)



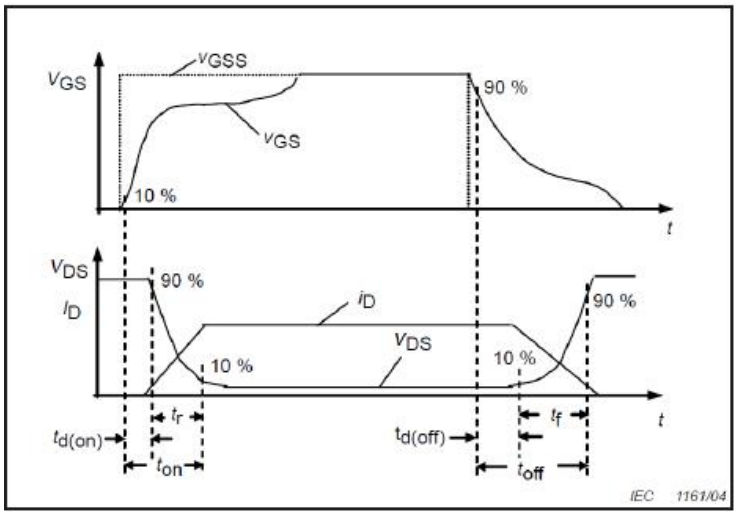
18) Safe Operating Area



19) Transient Thermal Impedance (Junction-Case)



20) Switching Times Definition



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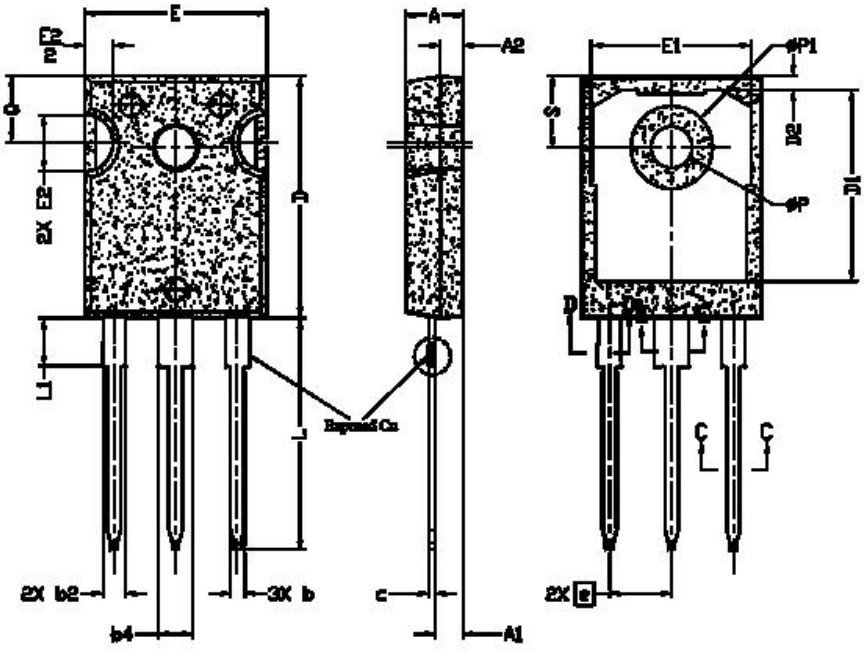

SYMBOL	DIMENSIONS			NOTES
	MIN	NOM	MAX	
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.50	2.00	2.49	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6,8
b5	2.87	3.00	3.18	
c	0.55	0.60	0.69	6
c1	0.55	6.00	0.65	
D	20.80	20.95	21.10	4
D1	16.25	16.55	17.65	5
D2	0.51	1.19	1.35	
E	15.75	15.94	16.13	4
E1	13.46	14.02	14.16	5
E2	4.32	4.91	5.49	3
e	5.44 BSC			
L	19.81	20.07	20.32	
L1	4.10	4.19	4.40	6
ΦP	3.56	3.61	3.65	7
ΦP1	7.19 REF			
Q	5.39	5.79	6.20	
S	6.04	6.17	6.30	

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