



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

Features

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

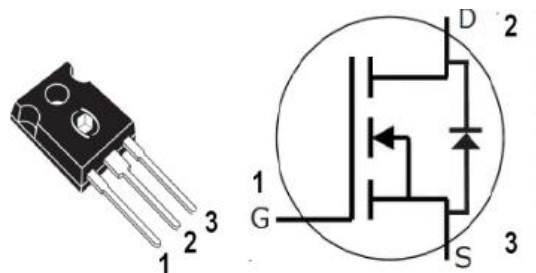
Key Characteristics		
V_{DS}	1200	V
$I_D, T_C = 25^\circ C$	40	A
$R_{DS(on)}$	80	mΩ

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}	$V_{GS} = 0\text{ V}$, $I_D = 100\text{ }\mu\text{A}$	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	$V_{GS} = 20\text{ V}$, $T_C = 25^\circ\text{C}$	40	A
		$V_{GS} = 20\text{ V}$, $T_C = 100^\circ\text{C}$	25.4	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	160	A
Power Dissipation	P_D	$T_C=25^\circ\text{C}$, $T_J=150^\circ\text{C}$	237	W
Operating Junction and Storage Temperature	T_j, T_{stg}		-55 to +150	$^\circ\text{C}$
Solder Temperature	T_L	1.6mm (0.063") from case for 10s	260	$^\circ\text{C}$
Mounting Torque	M_D	M3 or 6-32 screw	1	Nm
			8.8	lbf-in

Reverse Diode Characteristics

Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}$, $I_{SD} = 10\text{ A}$, $T_J=25^\circ\text{C}$	-	3.25		V
Continuous Diode Forward Current	I_S	$T_C=25^\circ\text{C}$		40		A
Reverse Recovery Time	t_{rr}	$V_{GS}=-5\text{ V}$ $I_{SD}=20\text{ A}$, $di/dt=100\text{ A/us}$ $V_{DD}=800\text{ V}$, $T_J=25^\circ\text{C}$	-	67		ns
Reverse Recovery Charge	Q_{rr}		-	46		nC
Peak Reverse Recovery Current	I_{rrm}			-1.2		A

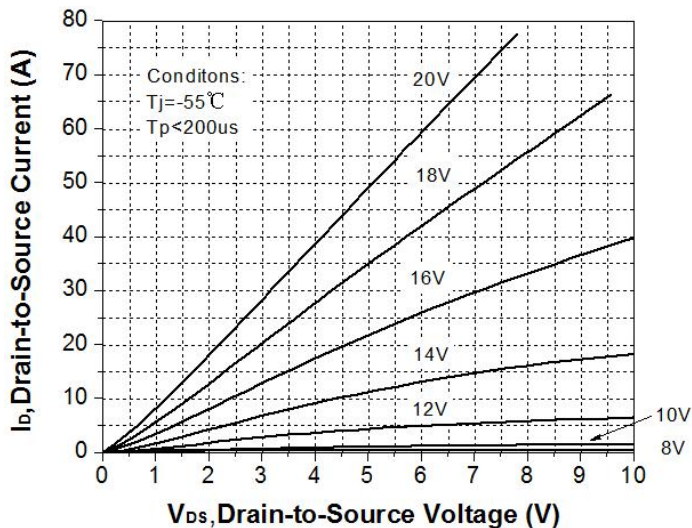
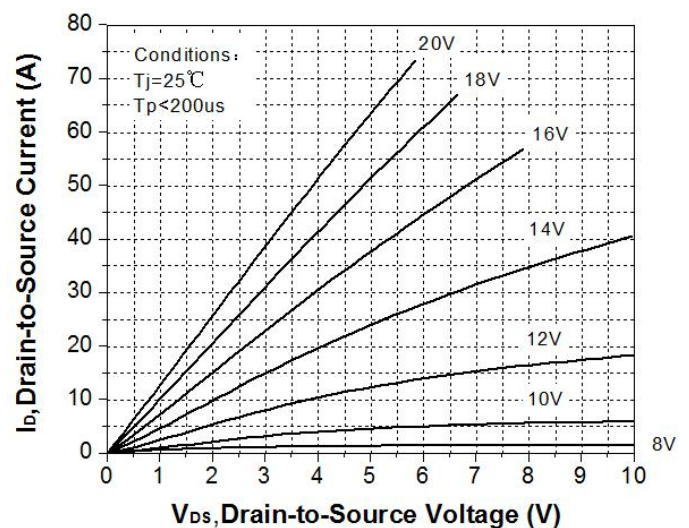
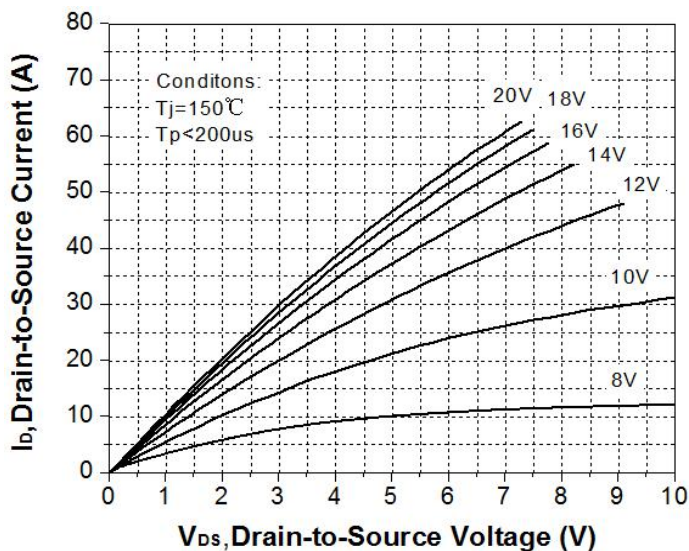
Electrical Characteristics

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

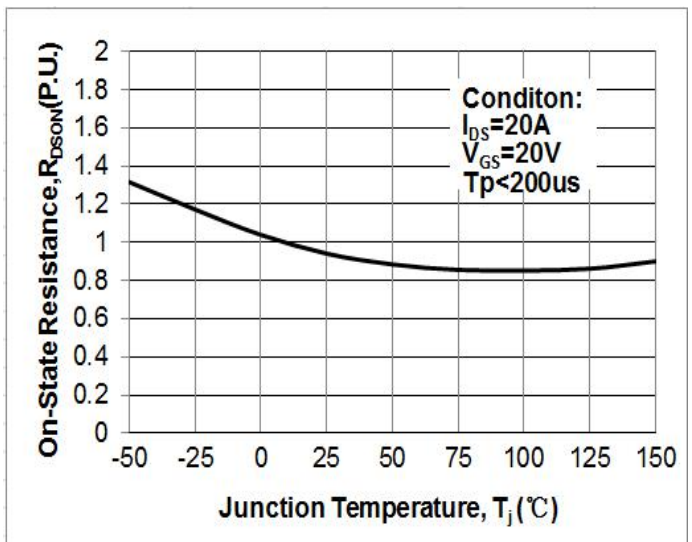
Thermal Characteristics

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

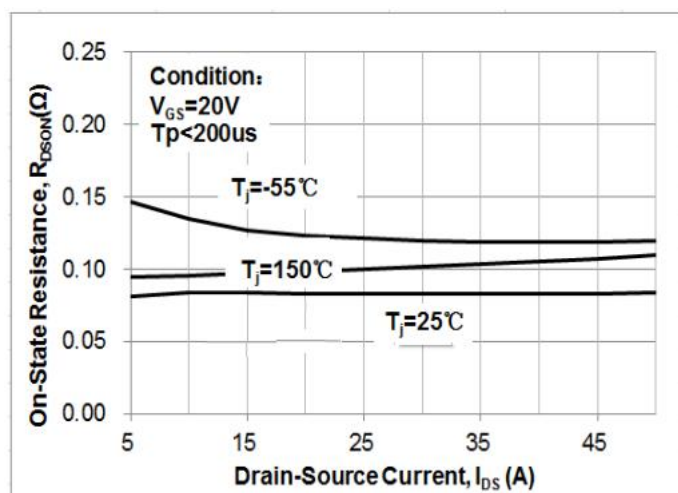
Performance Graphs

1) Output Characteristics $T_J = -55^\circ\text{C}$:2) Output Characteristics $T_J = 25^\circ\text{C}$:3) Output Characteristics $T_J = 150^\circ\text{C}$:

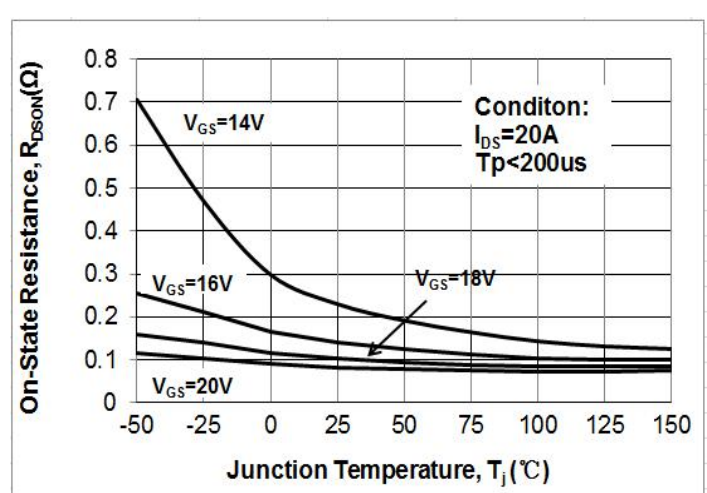
4) Normalized On-Resistance vs. Temperature



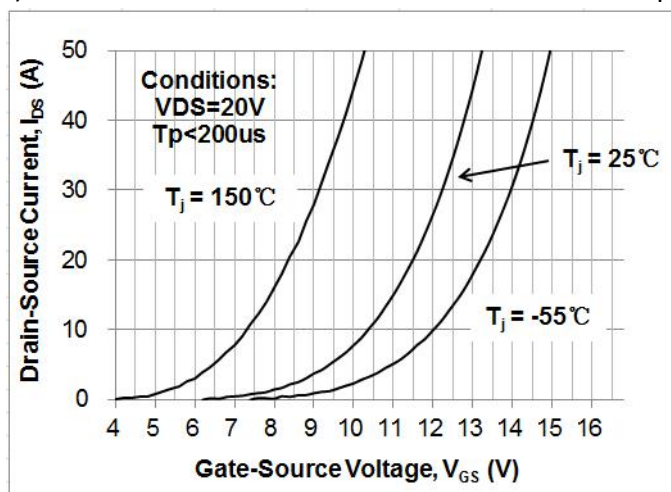
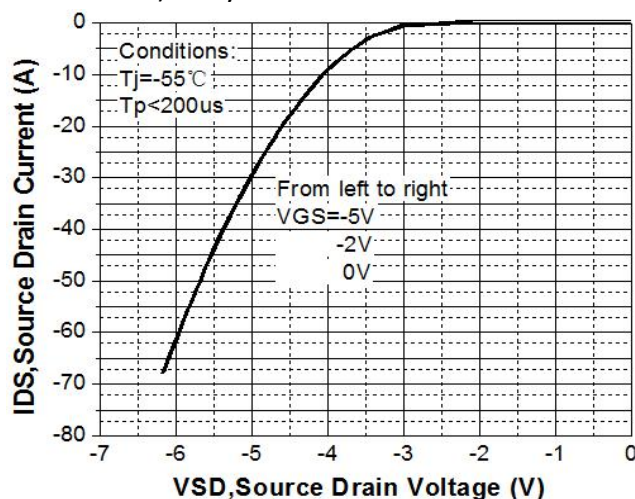
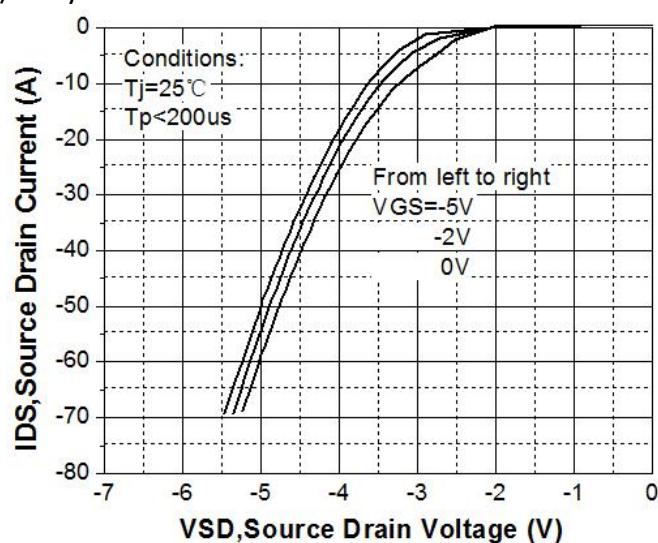
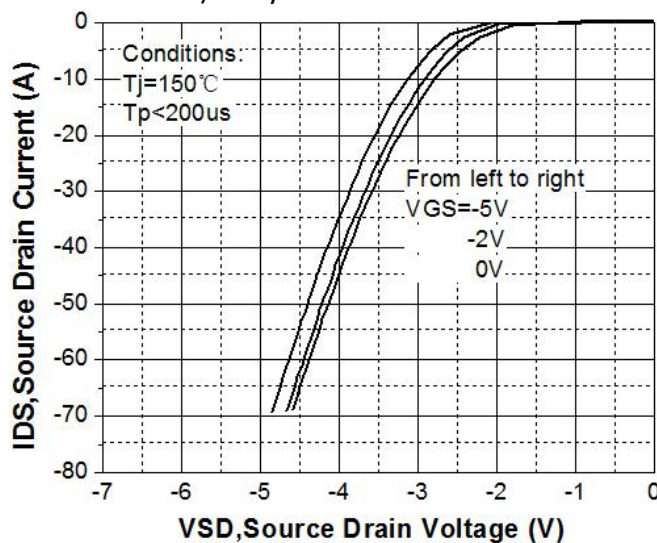
5) On-Resistance vs. Drain Current For Various Temperatures



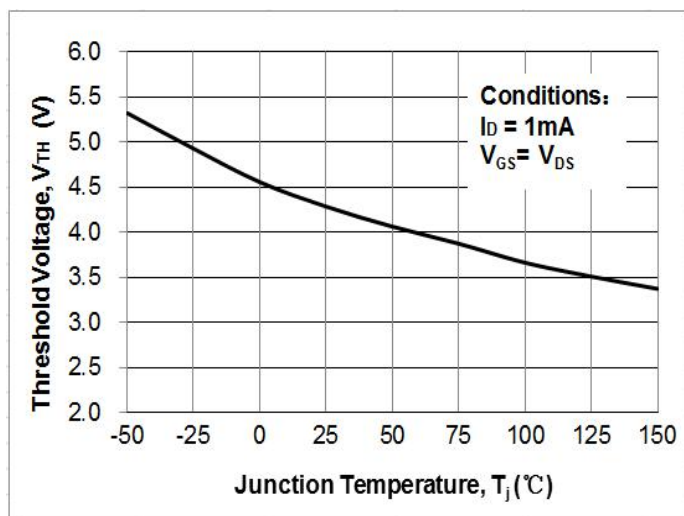
6) On-Resistance vs. Drain Current For Various Gate Voltage



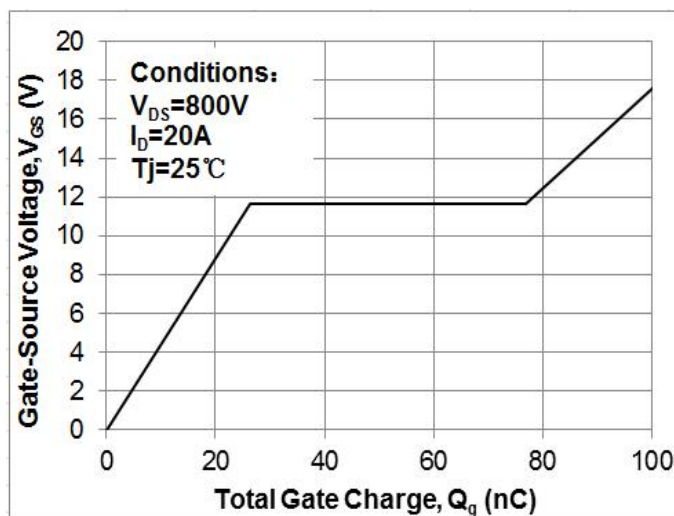
7) Transfer Characteristic for Various Junction Temperatures

8) body Diode Characteristic at $-55^\circ C$ 9) body Diode Characteristic at $25^\circ C$ 10) body Diode Characteristic at $150^\circ C$ 

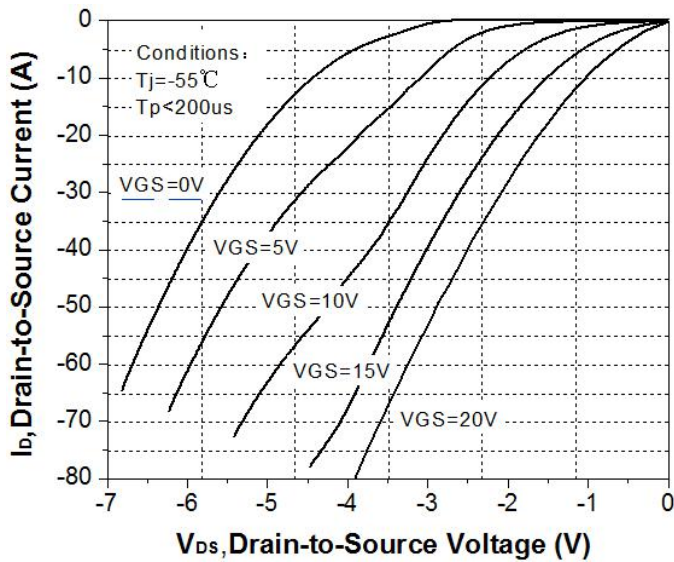
11) Threshold Voltage vs. Temperature



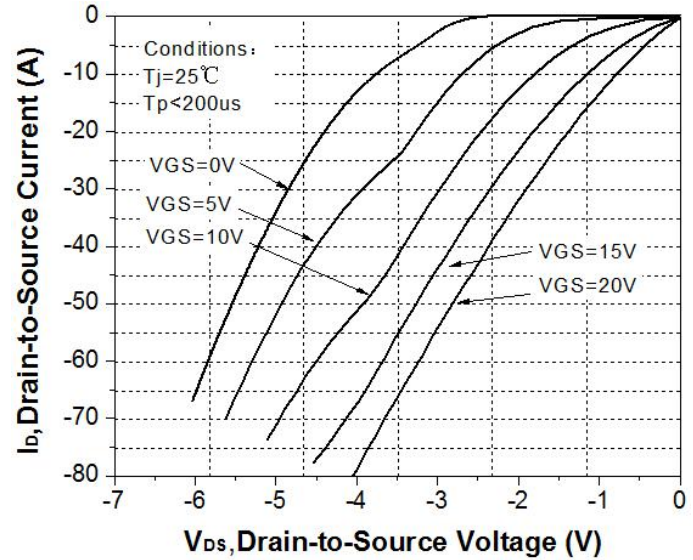
12) Gate Charge Characteristics



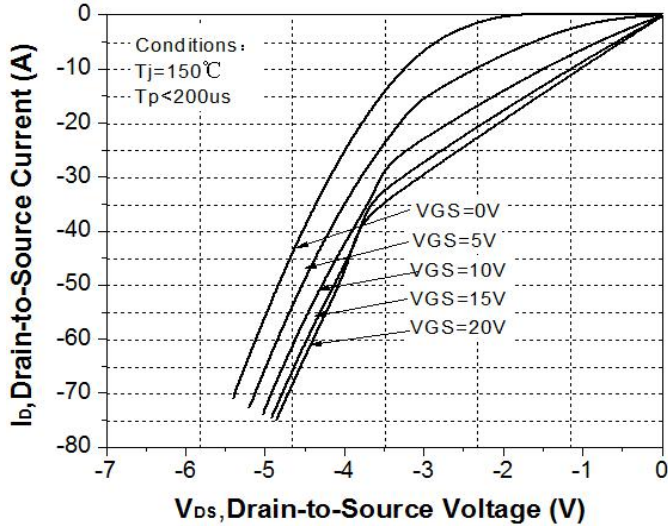
13) 3rd Quadrant Characteristic at -55°C



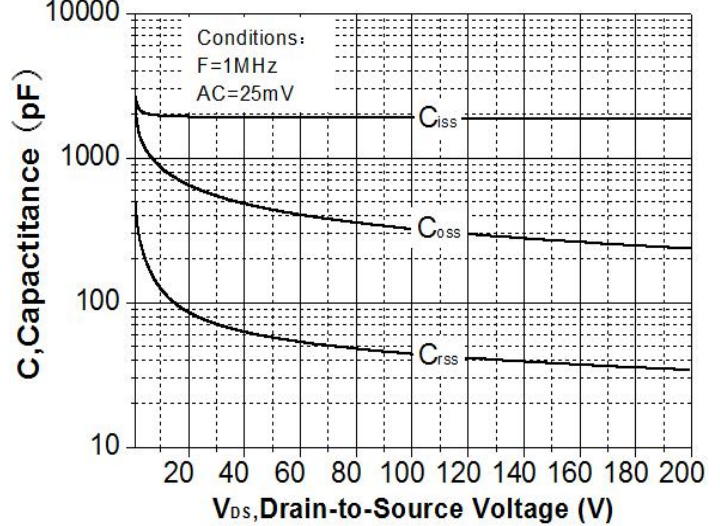
14) 3rd Quadrant Characteristic at 25°C



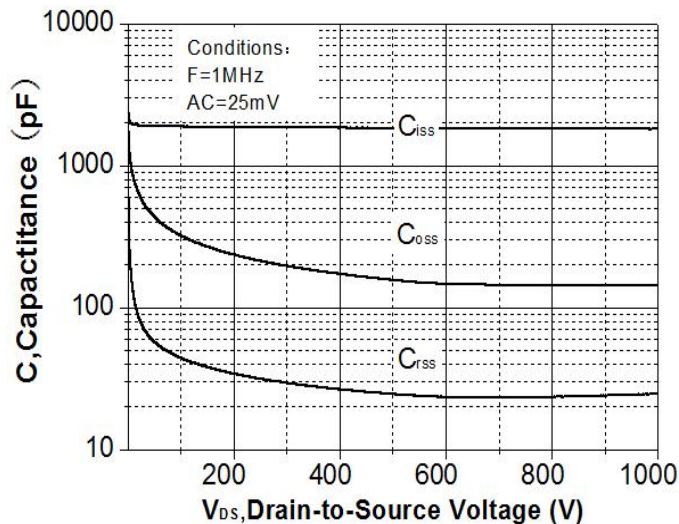
15) 3rd Quadrant Characteristic at 150°C



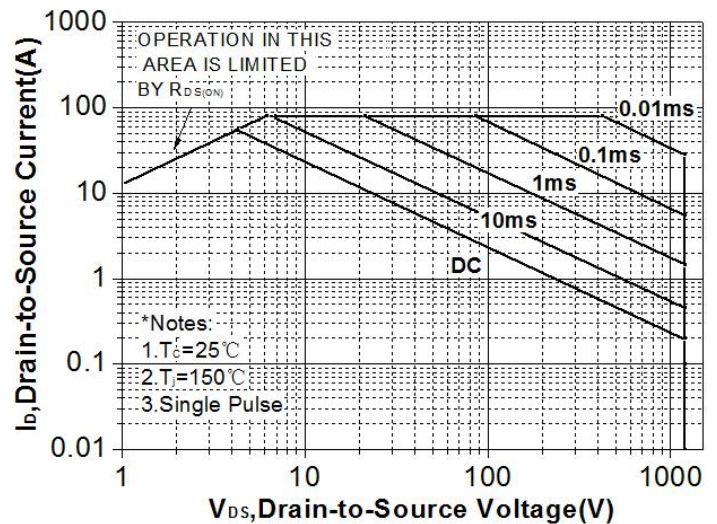
16) Capacitances vs. Drain-Source Voltage (0-200V)



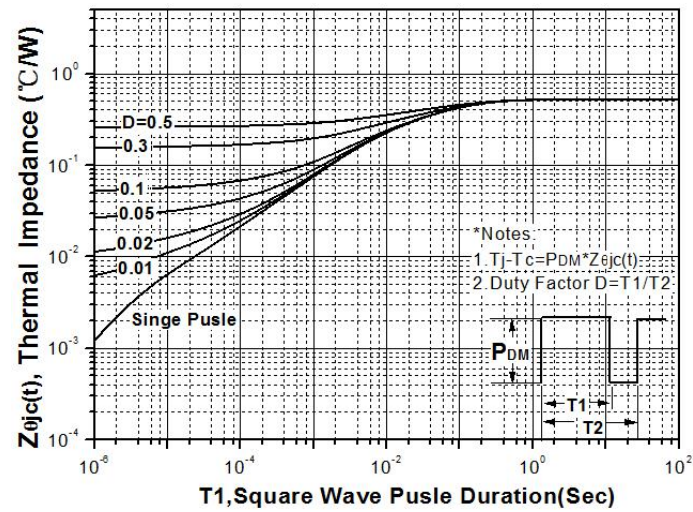
17) Capacitances vs. Drain-Source Voltage (0-1000V)



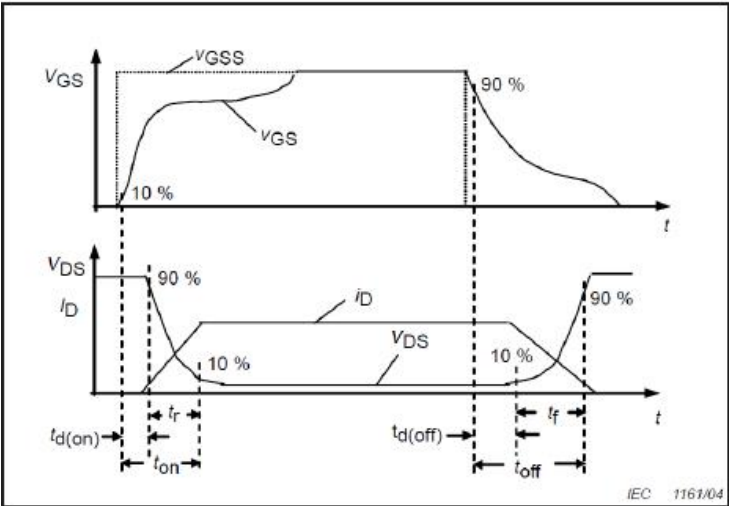
18) Safe Operating Area



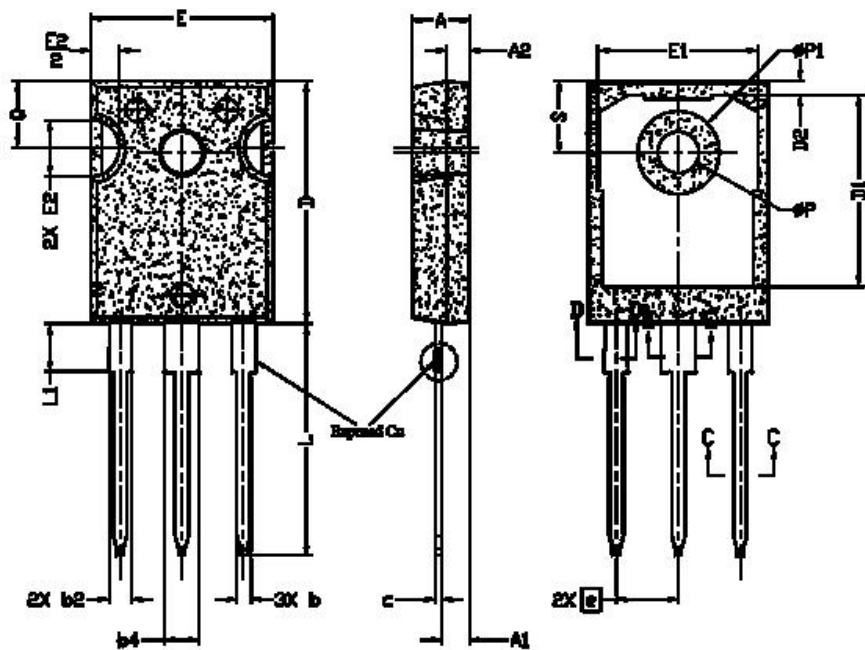
19) Transient Thermal Impedance (Junction-Case)



20) Switching Times Definition



Package TO-247



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	

Note: The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC(RoHS2). RoHS Certification and other certifications can be obtained from GPT sales representatives or GPT website: <http://globalpowertech.cn/English/index.asp>

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