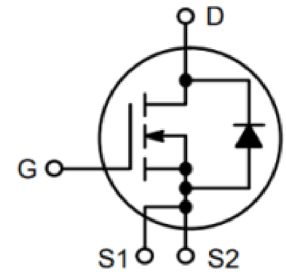
Silicon Carbide N-Channel Power MOSFET

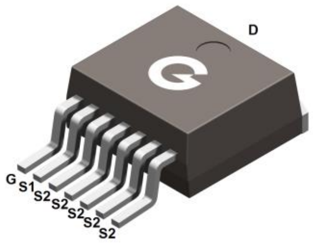
GSC120R080B7

Features

- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Low switching loss
- Sense pin for optimized switching performance
- RoHS compliant with Halogen-free

HF





TO-263-7

Applications

- Solar inverters
- Charger
- Uninterruptible Power Supply
- Switch Mode Power Supplies

Mechanical Data

- Case: TO-263-7
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GSC120R080B7	TO-263-7	1000 pcs / Tape & Reel	GSC120R080B7

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	1200	V
Gate-to-Source Voltage (transient)	V_{GSS}	-10/+22	V
Gate-to-Source Voltage (static)		-5/+18	V
Continuous Drain Current (T_C = 25°C)	I_D	28	A
Continuous Drain Current (T_C = 100°C)		20	A
Pulsed Drain Current	I_{DM}	79	A
Single Pulse Avalanche Energy [*2]	E_{AS}	128	mJ
Power Dissipation (T_C = 25°C)	P_D	158	W
Operating Junction Temperature Range	T_J	-55 ~ +175	°C
Storage Temperature Range	T_{STG}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	0.95	°C/W
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	-	-	40	°C/W

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 100μA	1200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1200V, V_{GS} = 0V	-	-	10	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = 22V, V_{DS} = 0V	-	-	100	nA
		V_{GS} = -10V, V_{DS} = 0V	-	-	-100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *1	V_{GS} = 18V, I_D = 12A, T_J = 25°C	-	80	100	mΩ
		V_{GS} = 18V, I_D = 12A, T_J = 175°C	-	120	-	
		V_{GS} = 15V, I_D = 12A, T_J = 25°C	-	100	130	
		V_{GS} = 15V, I_D = 12A, T_J = 175°C	-	130	-	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 5mA	2.1	-	3.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	2	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 800V f = 1MHz	-	1020	-	pF
C_{OSS}	Output Capacitance		-	70	-	
C_{RSS}	Reverse Transfer Capacitance		-	5	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *3	V_{DD} = 800V V_{GS} = -5/18V I_D = 12A R_G = 5Ω	-	7	-	ns
t_r	Turn-on Rise Time *3		-	8	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	17	-	
t_f	Turn-Off Fall Time *3		-	11	-	
E_{on}	Turn-On Energy *3		-	143	-	μJ
E_{off}	Turn-Off Energy *3		-	37	-	
Q_G	Total Gate-Charge	V_{DD} = 800V V_{GS} = -5/18V I_D = 12A	-	50	-	nC
Q_{GS}	Gate to Source Charge		-	17	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	13	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *1	I_{SD} = 12A, V_{GS} = -5V, T_J = 25°C	-	4.0	-	V
		I_{SD} = 12A, V_{GS} = -5V, T_J = 175°C	-	3.6	-	
trr	Reverse Recovery Time	I_F = 12A, V_R = 800V d_I/d_t = 1000A/μs	-	11	-	ns
Qrr	Reverse Recovery Charge		-	65	-	nC

Notes:

1. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
2. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 120V, V_{GS} = 18V, L = 1mH
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

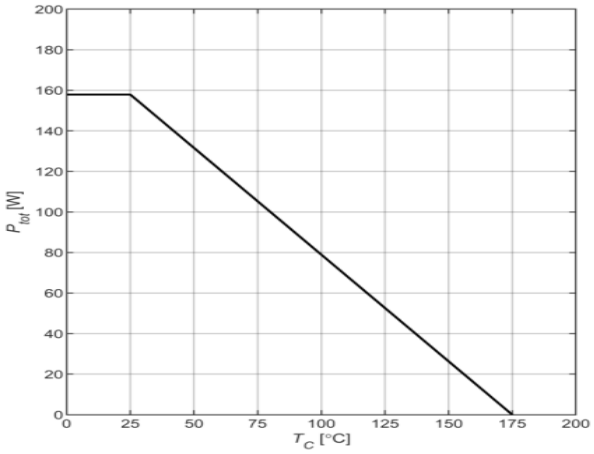


Fig 1 Power Dissipation

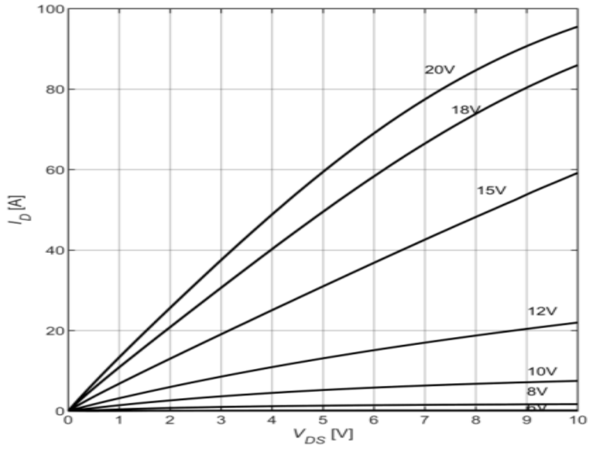


Fig 2 Typical Output Characteristics (T_J = -55°C)

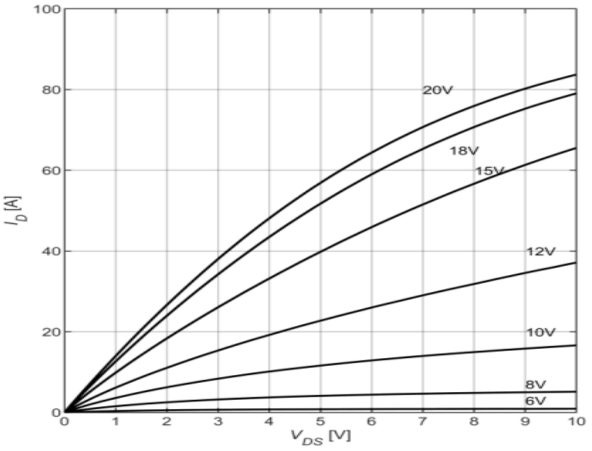


Fig 3 Typical Output Characteristics (T_J = 25°C)

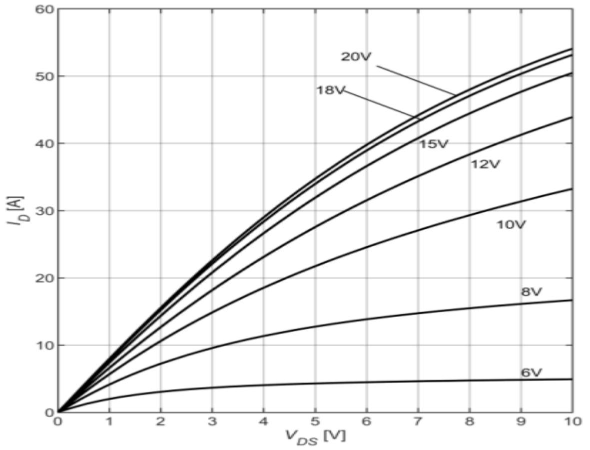


Fig 4 Typical Output Characteristics (T_J = 175°C)

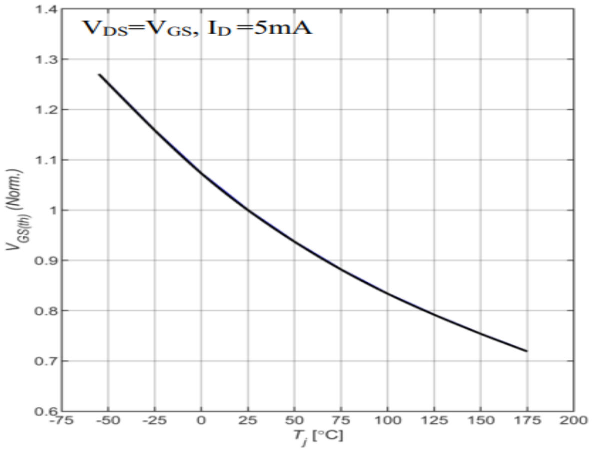


Fig 5 Normalized $V_{GS(th)}$ vs. Junction Temperature

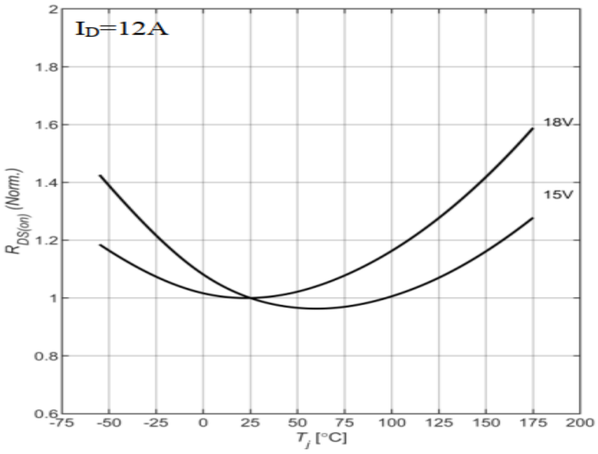


Fig 6 Normalized On-Resistance vs. Junction Temperature

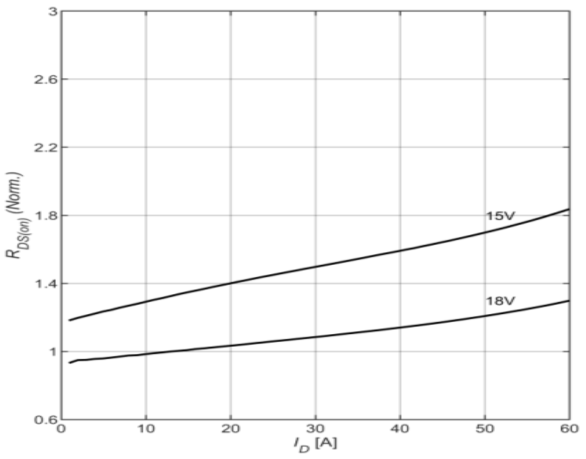


Fig 7 Normalized On-Resistance vs. Drain Current

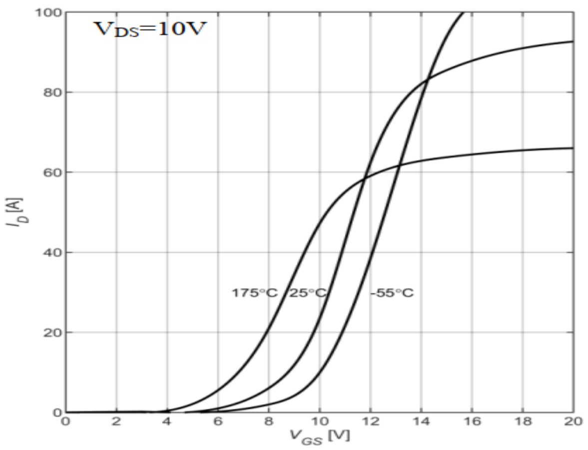


Fig 8 Transfer Characteristics

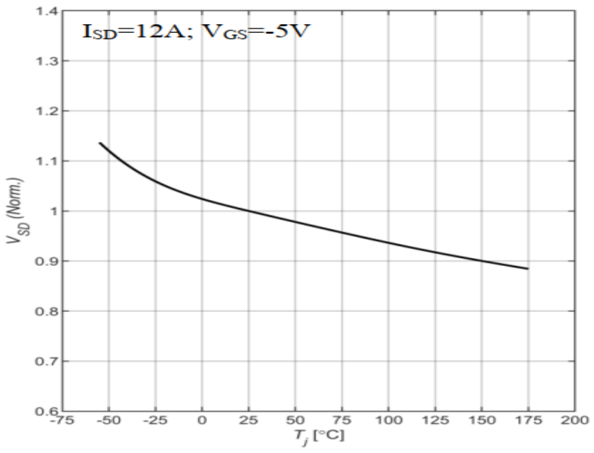


Fig 9 Normalized Diode Forward Voltage vs. Junction Temperature

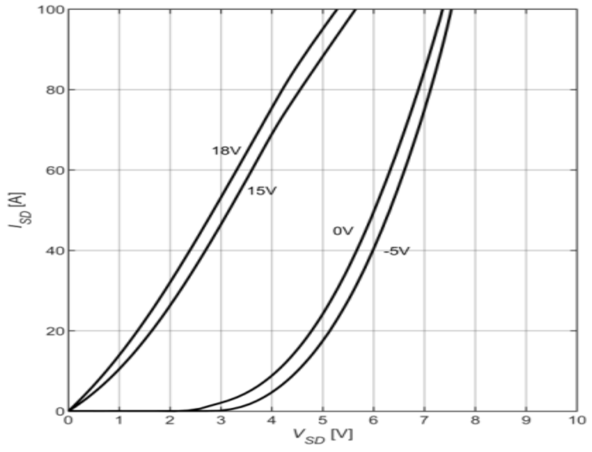


Fig 10 Body-Diode Characteristics (T_J = -55°C)

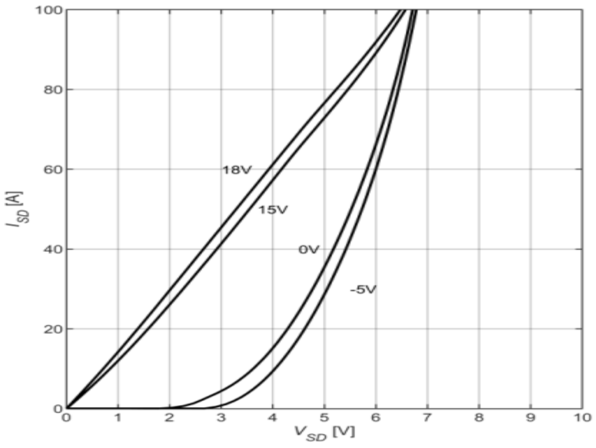


Fig 11 Body-Diode Characteristics (T_J = 25°C)

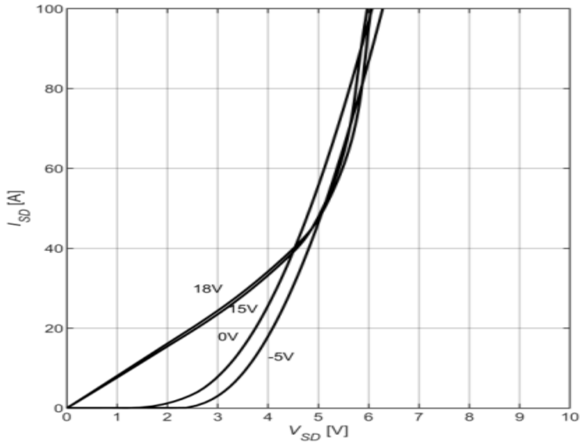
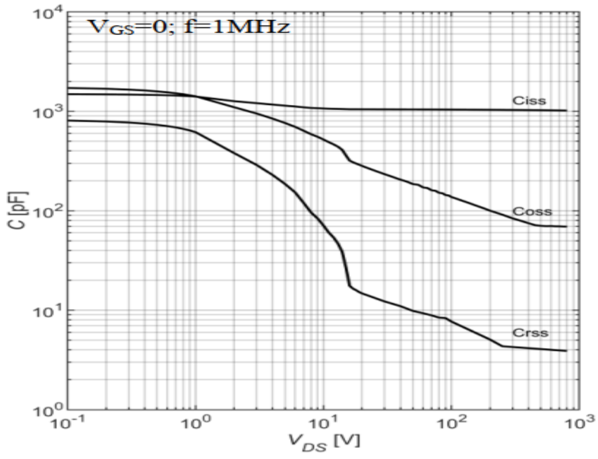


Fig 12 Body-Diode Characteristics (T_J = 175°C)



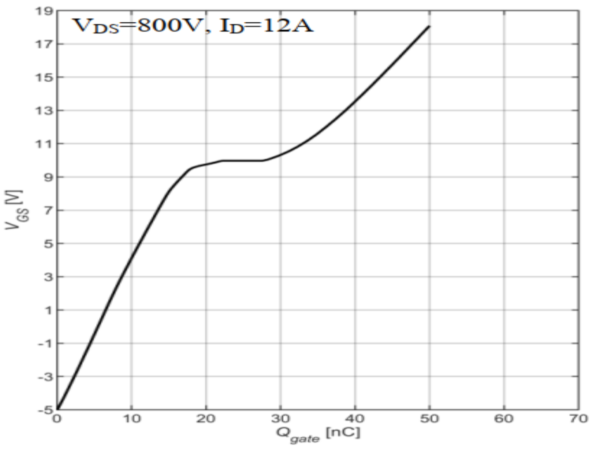
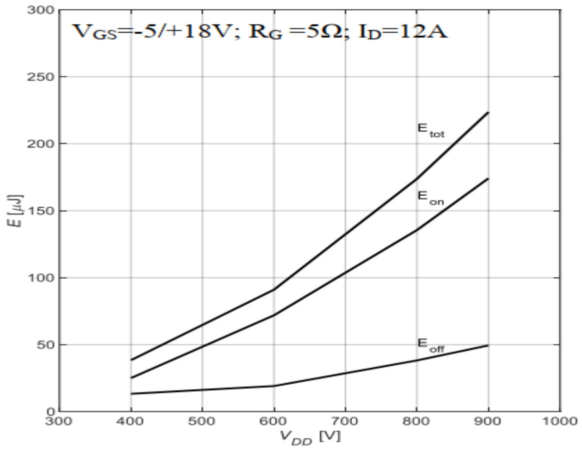


Fig 13 Capacitance Characteristics

Fig 14 Gate-Charge Characteristics



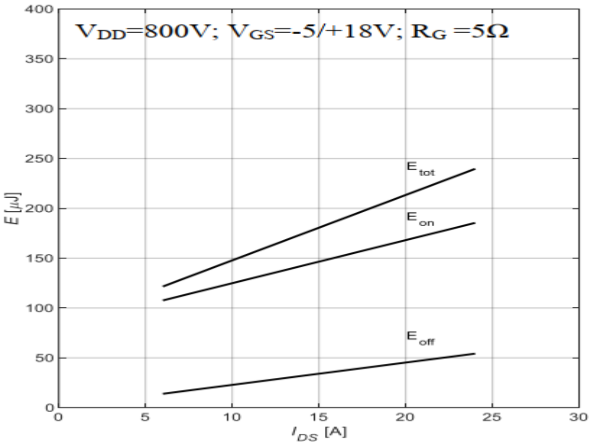
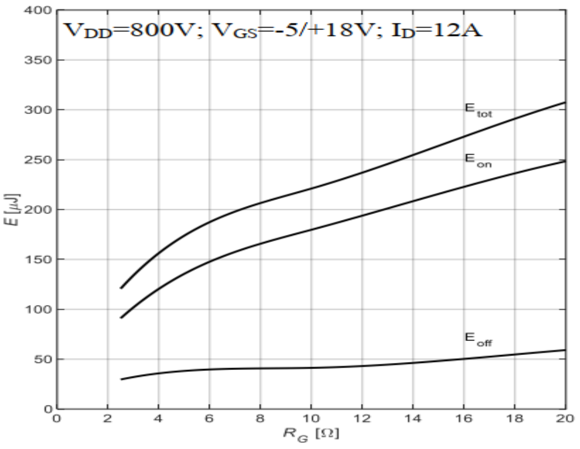


Fig 15 Output Capacitor Stored Energy

Fig 16 Clamped Inductive Switching Energy vs. Drain Current



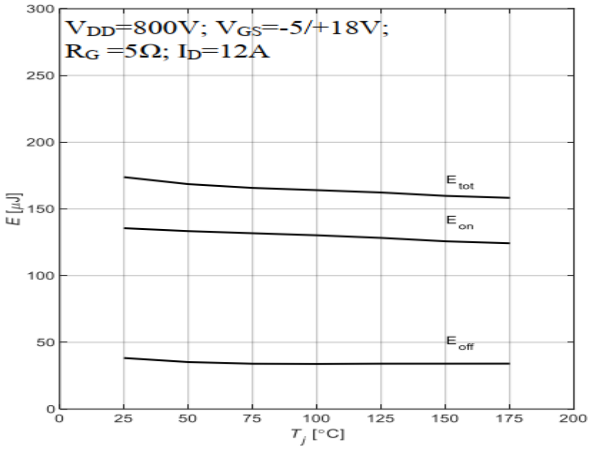


Fig 17 Clamped Inductive Switching Energy vs. R_G

Fig 18 Clamped Inductive Switching Energy vs. Junction Temperature

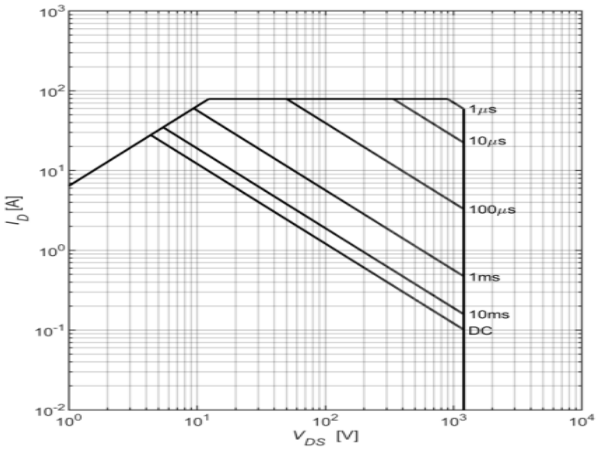


Fig 19　Safe Operating Area

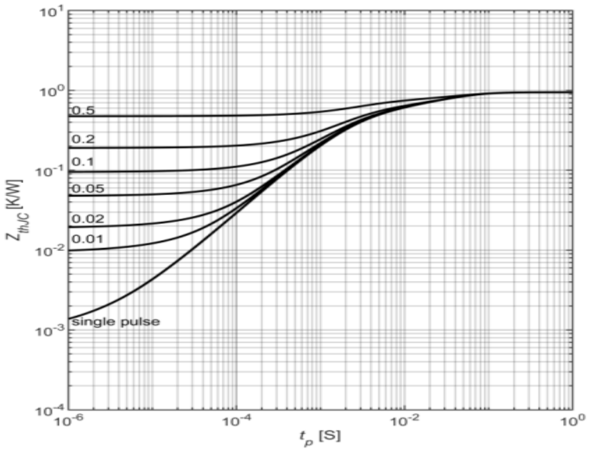
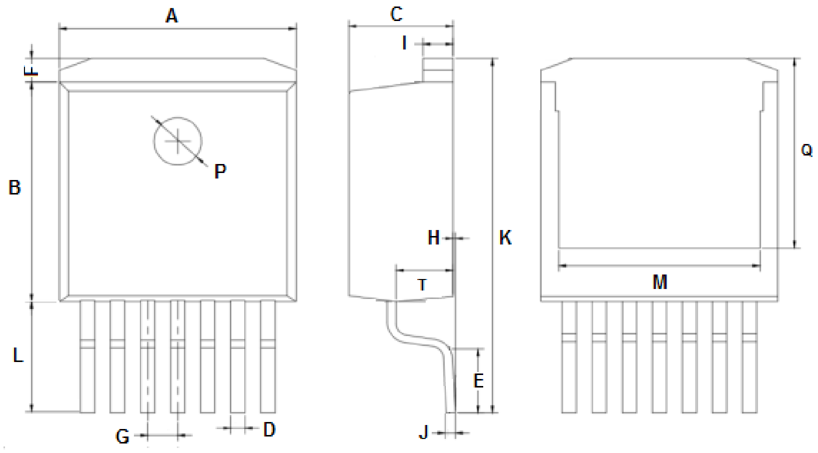


Fig 20　Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



TO-263-7		
Dimension	**Min.**	**Max.**
A	9.80	10.20
B	9.05	9.45
C	4.30	4.70
D	0.52	0.72
E	2.48	2.88
F	0.87	1.27
G	1.17	1.37
H	0.00	0.25
I	1.07	1.47
J	0.42	0.62
K	14.87	15.27
L	4.55	4.95
M	7.80	8.20
P	1.40	1.80
Q	7.58	7.98
T	2.20	2.60