

N-Channel Enhancement Mode Power MOSFET

Description

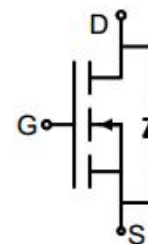
The GC190N65QF uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

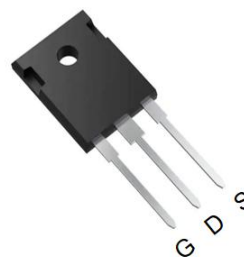
- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 19A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 190m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GC190N65QF	TO-247	GC190N65F	30pcs/Tube

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Continuous Drain Current	I_D	19	A
		12	
Pulsed Drain Current (note1)	I_{DM}	57	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	148	W
Single pulse avalanche energy (note2)	E_{AS}	14	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	65	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	0.85	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	--	--	5	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.2	4.0	4.6	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 10A	--	150	190	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D = 10A	--	11	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 400V, f = 1.0MHz	--	1100	--	pF
Output Capacitance	C _{oss}		--	35	--	
Reverse Transfer Capacitance	C _{rss}		--	3	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 10A, V _{GS} = 10V	--	36	--	nC
Gate-Source Charge	Q _{gs}		--	10	--	
Gate-Drain Charge	Q _{gd}		--	20	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 400V, I _D = 10A, R _G = 5Ω	--	46	--	ns
Turn-on Rise Time	t _r		--	61	--	
Turn-off Delay Time	t _{d(off)}		--	120	--	
Turn-off Fall Time	t _f		--	34	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	19	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 10A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 10A, V _{GS} = 0V di/dt=500A/us	--	0.32	--	μC
Reverse Recovery Time	T _{rr}		--	95	--	ns

Notes

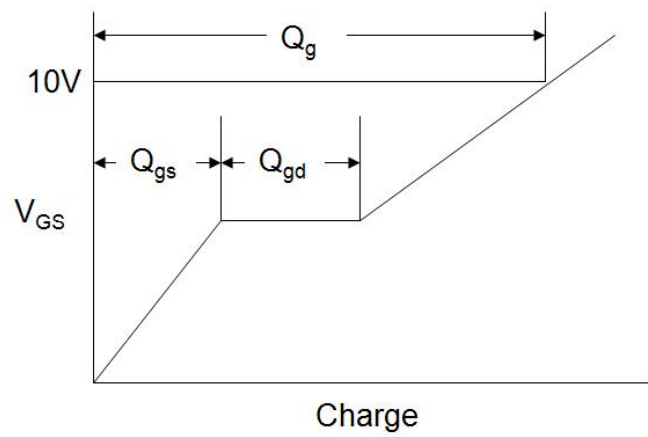
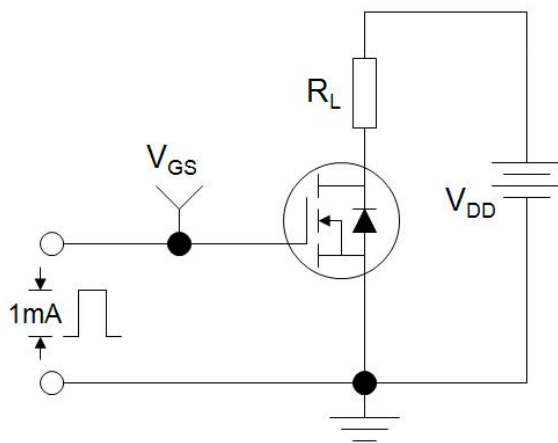
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^{\circ}\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 10mH$, $R_G = 25\Omega$

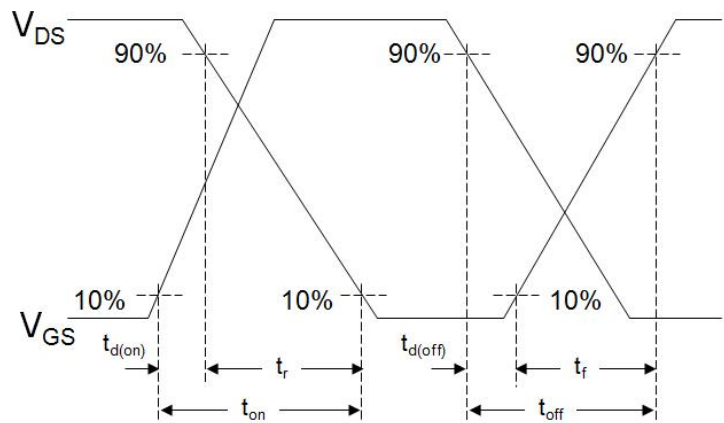
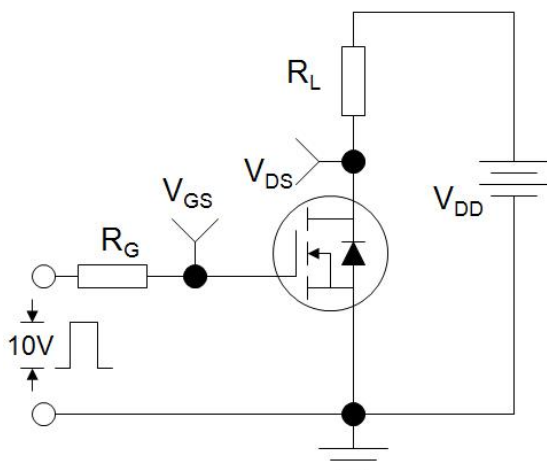
The table shows the minimum avalanche energy, which is 39mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

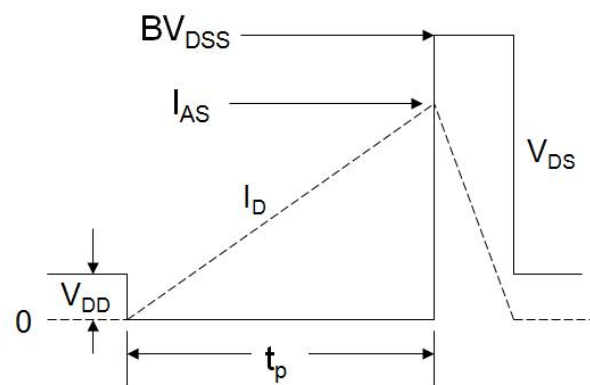
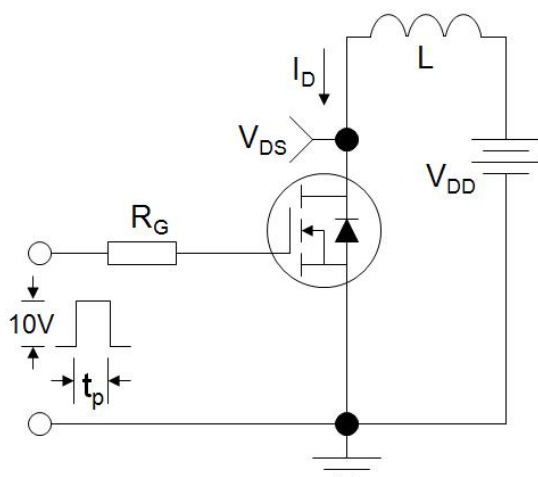
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

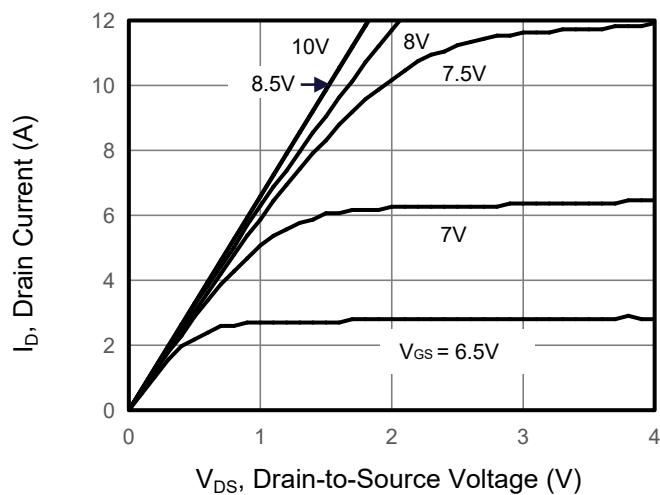


Figure 2. Transfer Characteristics

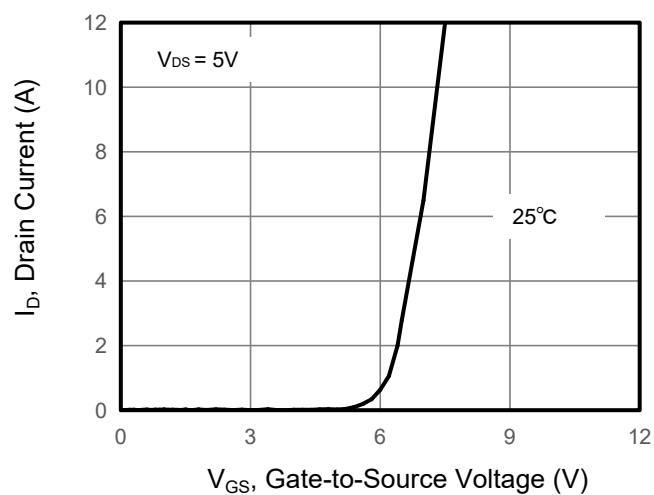


Figure 3. Drain Source On Resistance

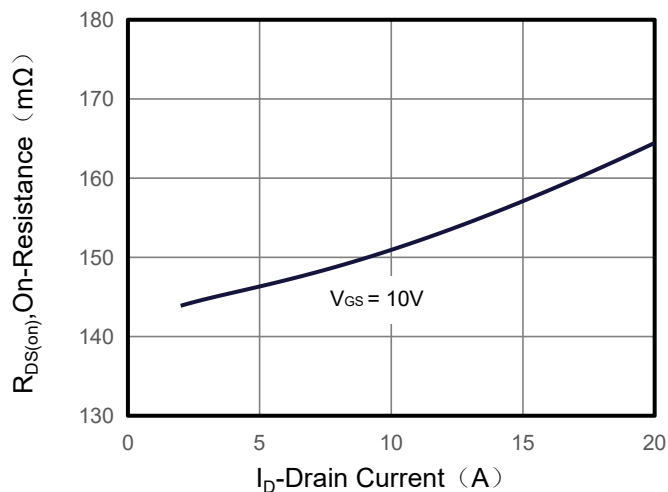


Figure 4. Gate Charge

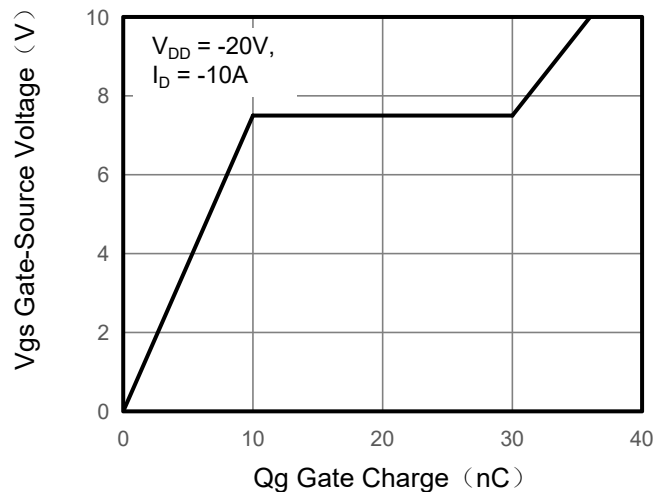


Figure 5. Capacitance

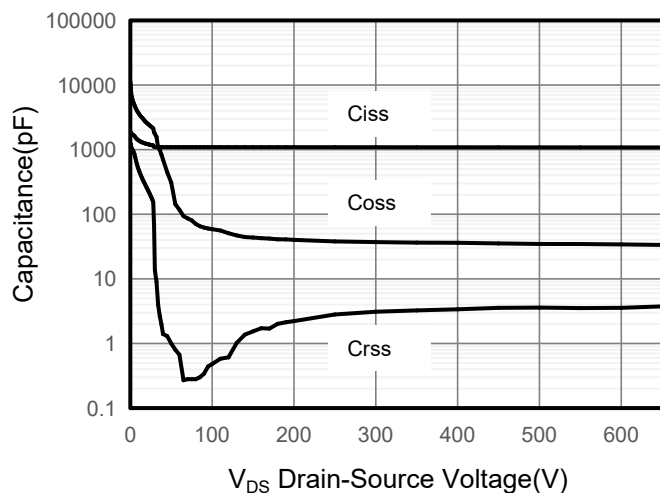
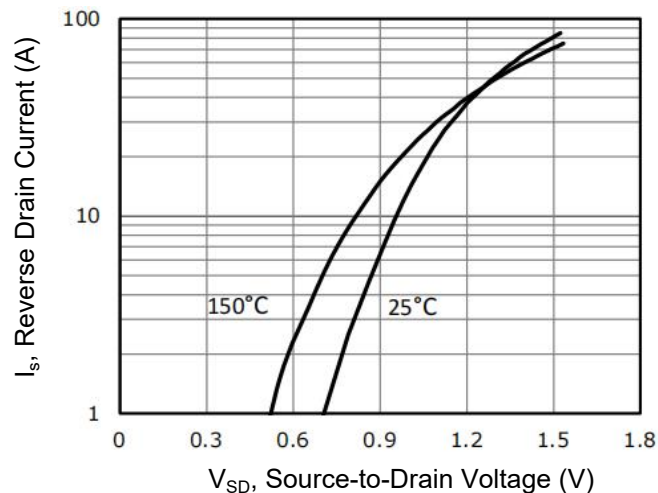


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

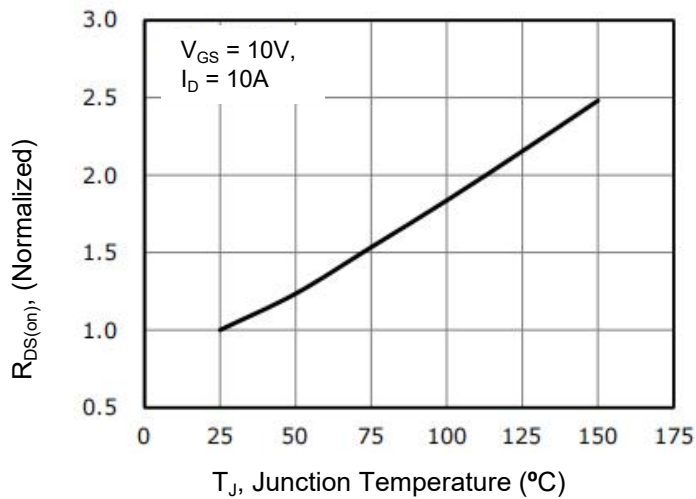


Figure 8. Safe Operation Area

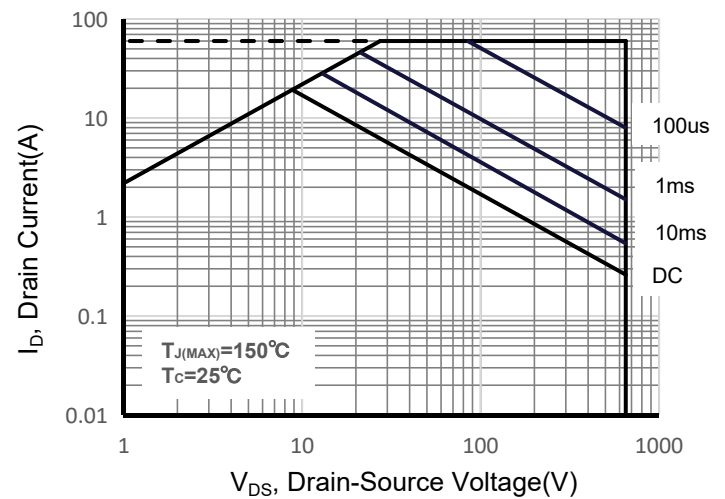


Figure 9. Maximum Continuous Drain Current vs Case Temperature

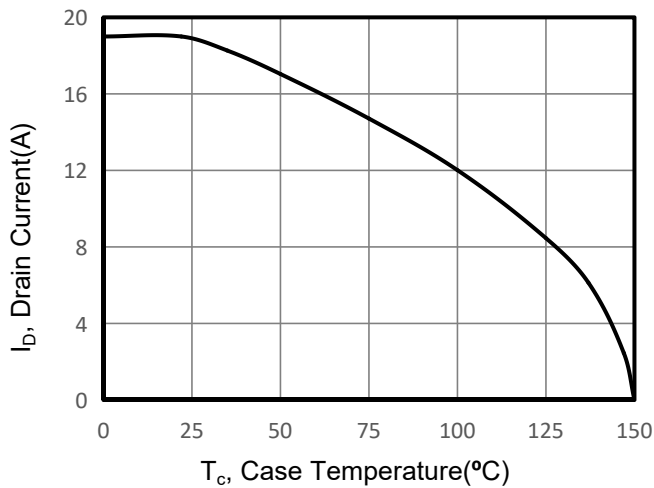
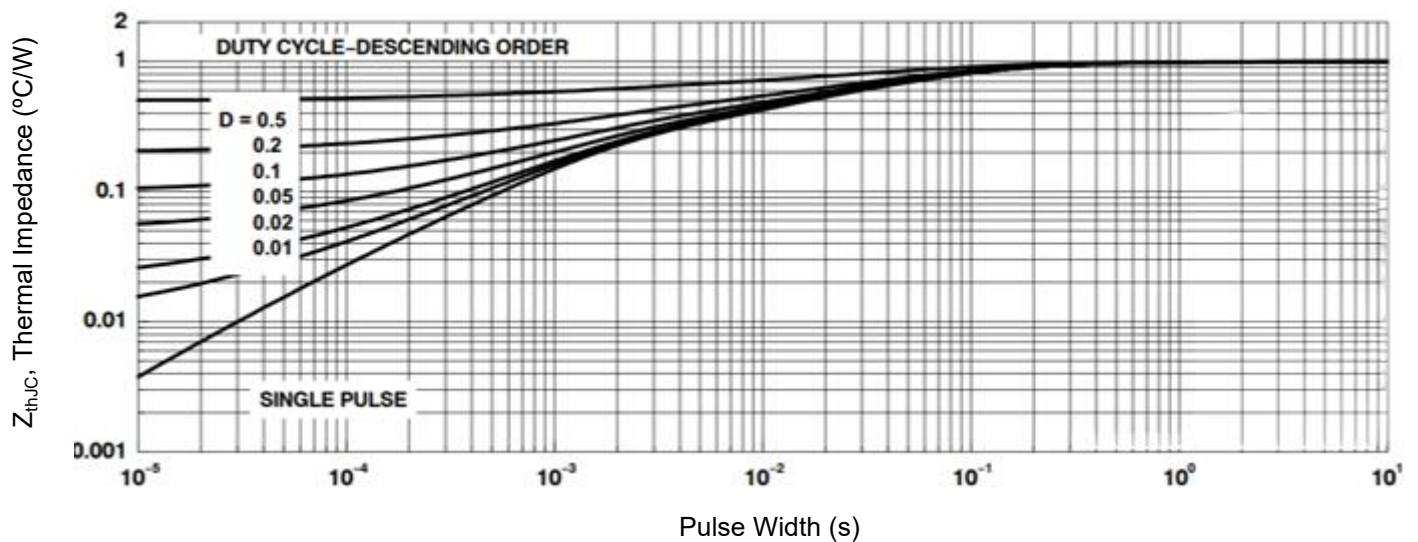
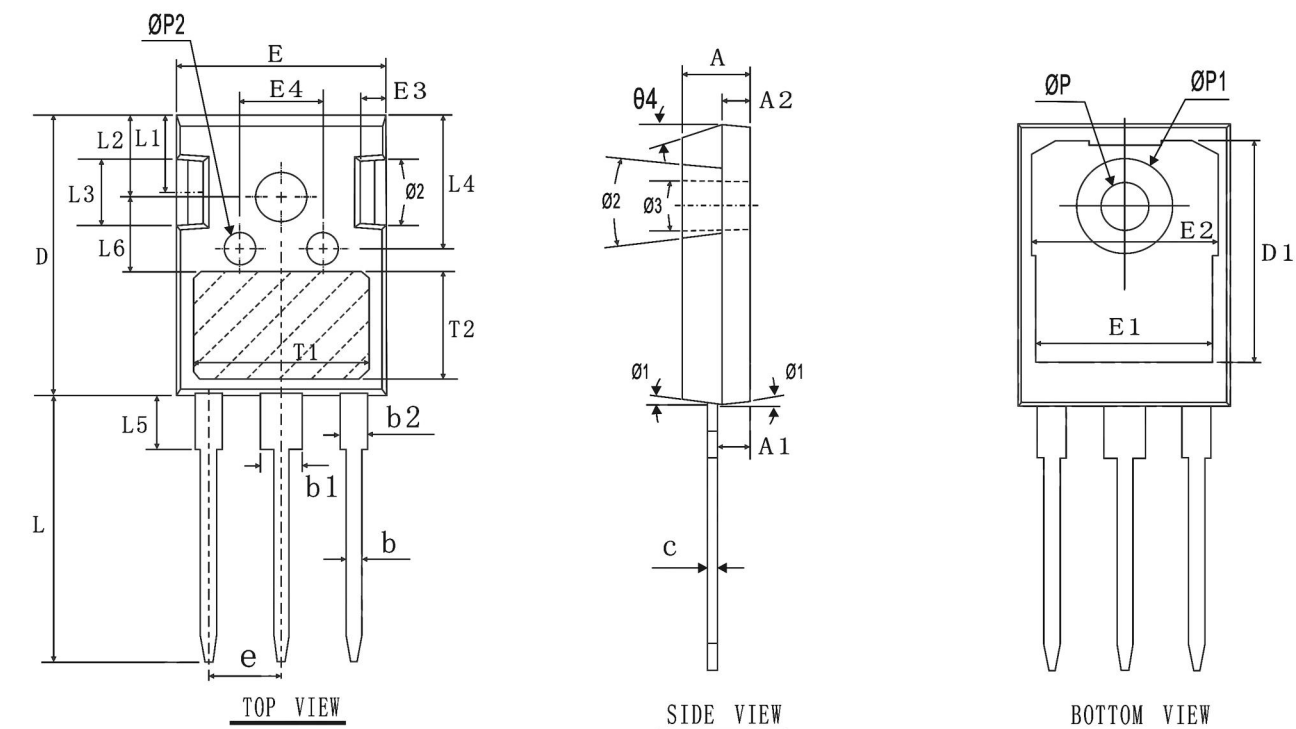


Figure 10. Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A 1	2.20	2.40	2.60
A 2	1.85	2.00	2.15
b	1.10	1.20	1.30
b 1	2.80	3.00	3.20
b 2	1.80	2.00	2.20
c	0.52	0.62	0.72
D	20.35	20.65	20.95
D 1	16.35	16.55	16.75
E	15.50	15.80	16.10
E 1	13.10	13.30	13.50
E 2	13.80	14.00	14.20
E 3	1.45	1.60	1.75
E 4	6.00	6.20	6.40
L	19.80	20.00	20.20
L 1	5.88	5.98	6.08
L 2	5.88	5.98	6.08
L 3	4.90	5.00	5.10
L 4	9.70	9.80	9.90
L 5	4.10	4.30	4.50
Ø1	4°	7°	10°
Ø2	11°	14°	17°
Ø3	1°	--	2°
Ø4	10°	15°	20°
ØP	3.35	3.60	3.85
ØP1	--	--	7.30
ØP2	2.25	2.50	2.75
e	5.44BSC		
T 1	12.80REF		
T 2	7.80REF		
L 6	5.50REF		