

N-Channel Enhancement Mode Power MOSFET

Description

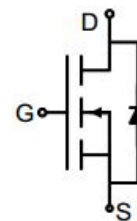
The GC060N65QF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

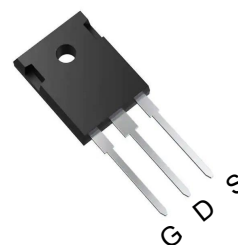
- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 50A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 60m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GC060N65QF	TO-247	GC060N65F	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	$T_C = 25^\circ\text{C}$	50	A
	$T_C = 100^\circ\text{C}$	31	
Pulsed Drain Current (note1)	I_{DM}	149	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	388	W
Single pulse avalanche energy (note2)	E_{AS}	810	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}	47	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.32	$^\circ\text{C/W}$

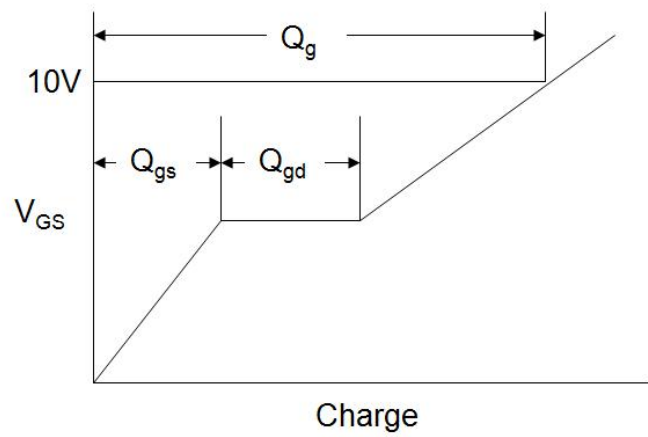
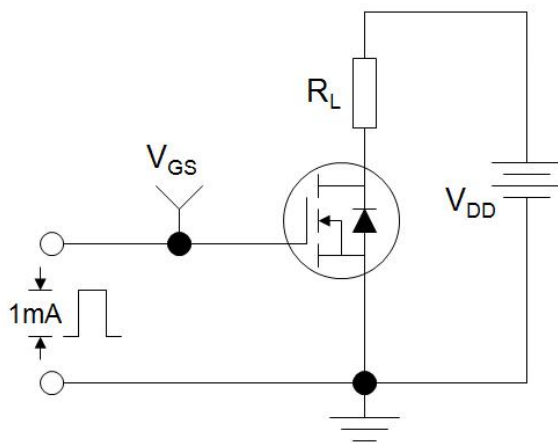
Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$	--	--	5	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.2	--	4.6	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 25A$	--	45	60	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 20V, I_D = 25A$	--	38	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 100V,$ $f = 1.0MHz$	--	3395	--	pF
Output Capacitance	C_{oss}		--	217	--	
Reverse Transfer Capacitance	C_{rss}		--	2.5	--	
Total Gate Charge	Q_g	$V_{DD} = 480V,$ $I_D = 25A,$ $V_{GS} = 10V$	--	128	--	nC
Gate-Source Charge	Q_{gs}		--	27	--	
Gate-Drain Charge	Q_{gd}		--	79	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V,$ $I_D = 25A,$ $R_G = 10\Omega$	--	44	--	ns
Turn-on Rise Time	t_r		--	90	--	
Turn-off Delay Time	$t_{d(off)}$		--	172	--	
Turn-off Fall Time	t_f		--	54	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^{\circ}C$	--	--	50	A
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}C, I_{SD} = 25A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Charge	Q_{rr}	$I_F = 25A, V_{GS} = 0V$ $di/dt=100A/us$	--	0.85	--	μC
Reverse Recovery Time	T_{rr}		--	150	--	ns

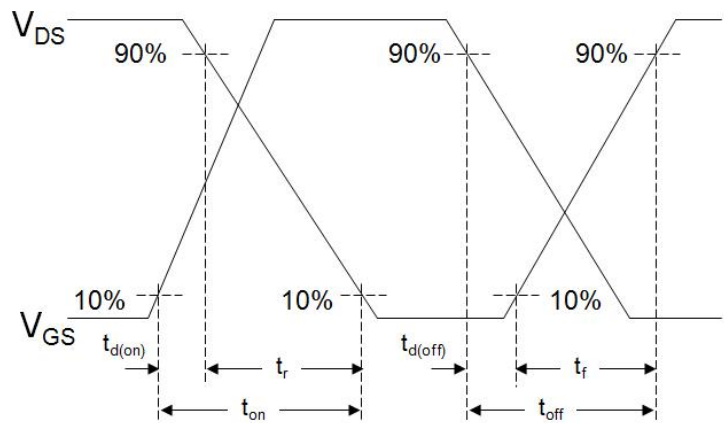
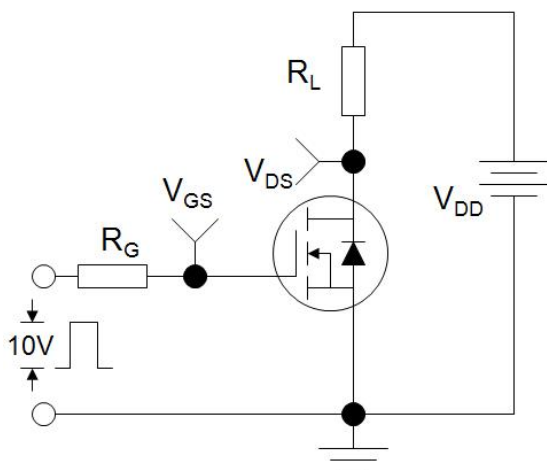
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 30mH$, $R_G = 25\Omega$
3. Identical low side and high side switch with identical R_G

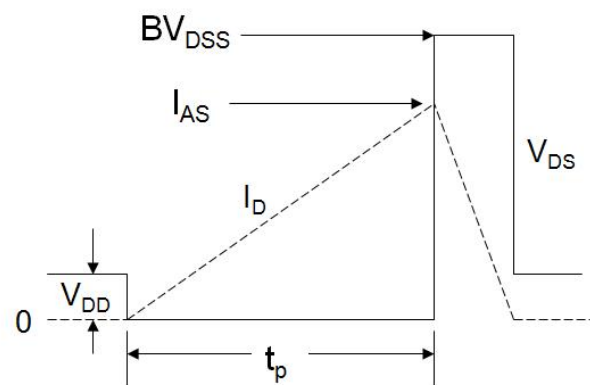
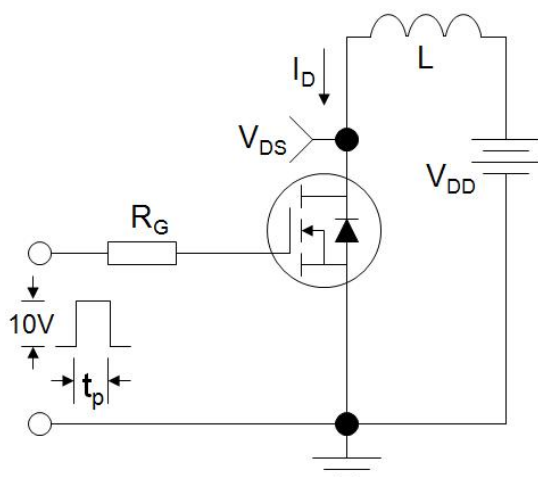
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

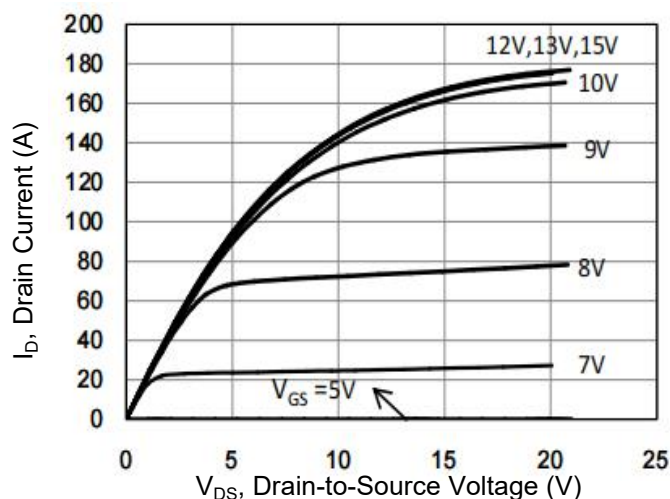


Figure 2. Transfer Characteristics

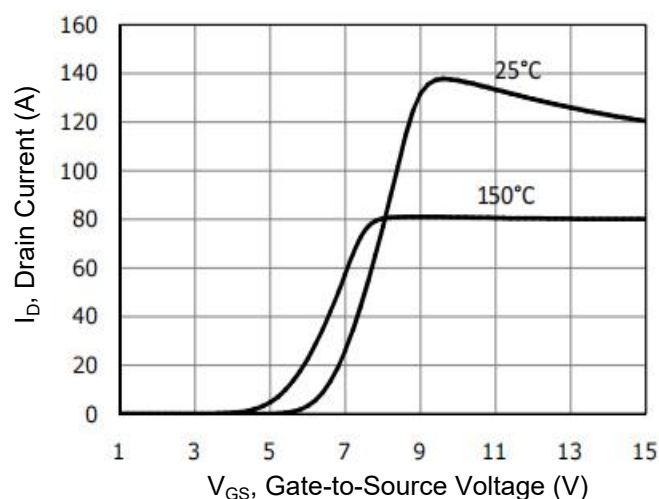


Figure 3. Drain Source On Resistance

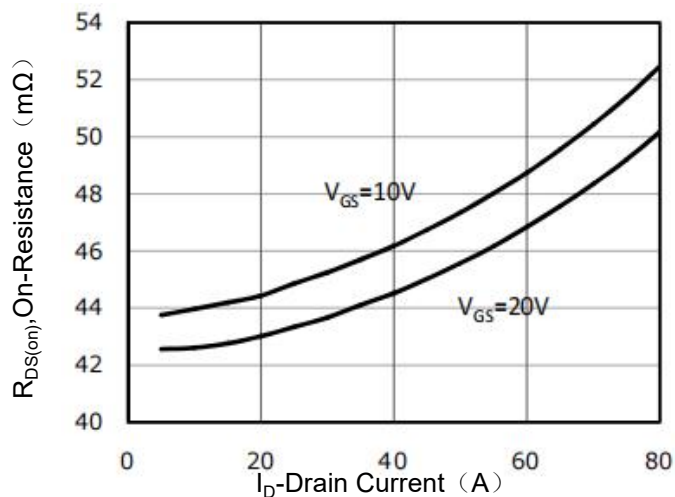


Figure 4. Gate Charge

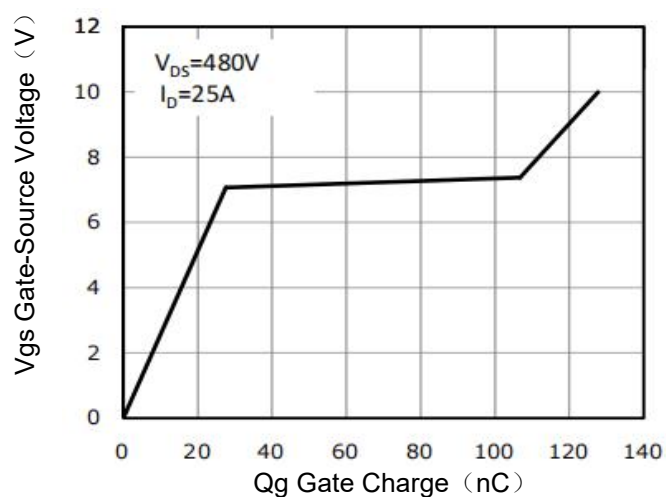


Figure 5. Capacitance

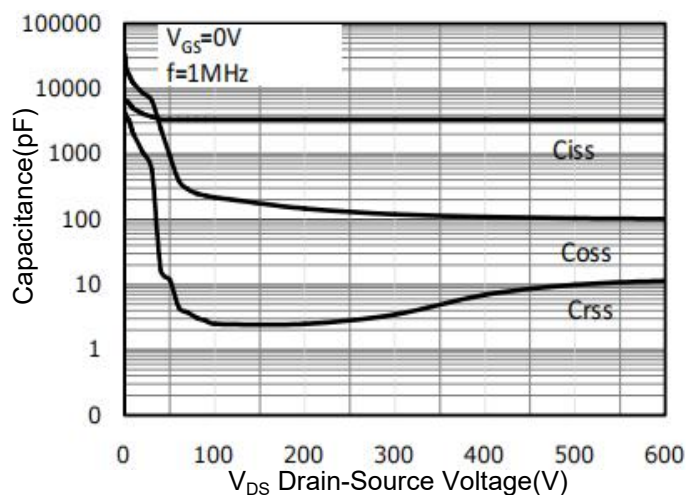
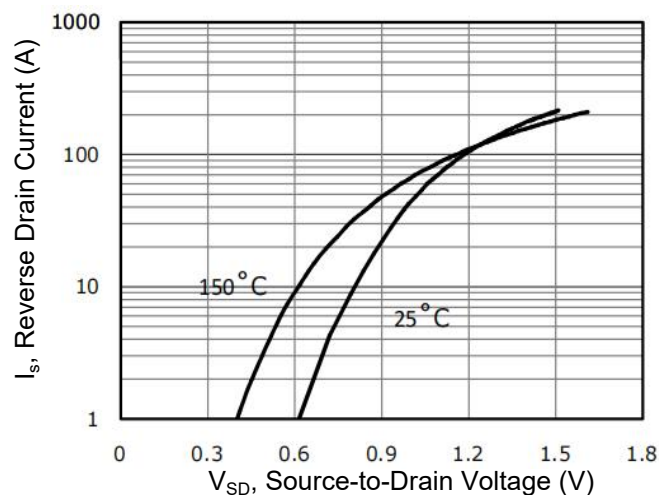


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

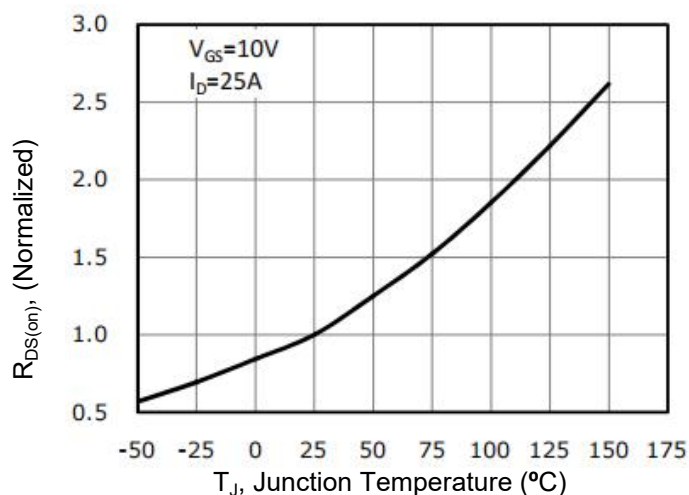


Figure 8. Safe Operation Area

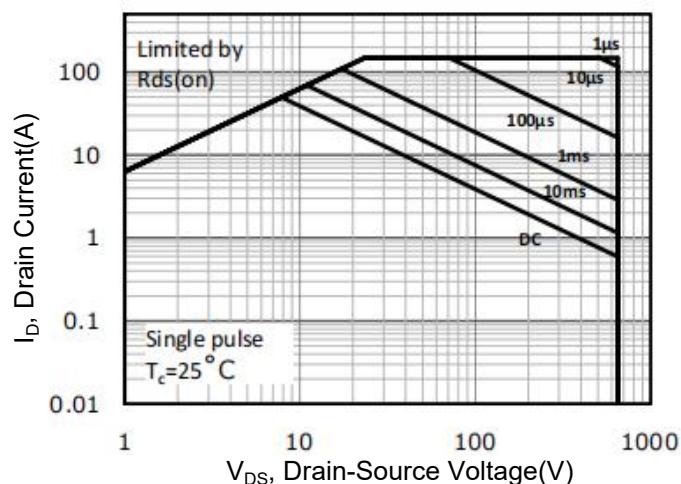


Figure 9. Maximum Continuous Drain Current vs Case Temperature

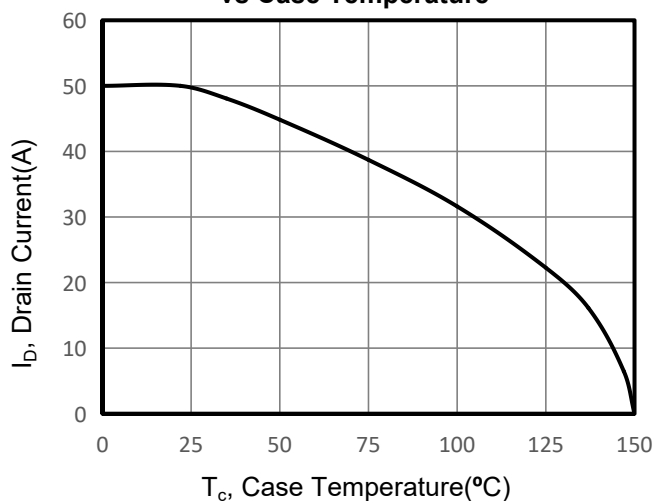
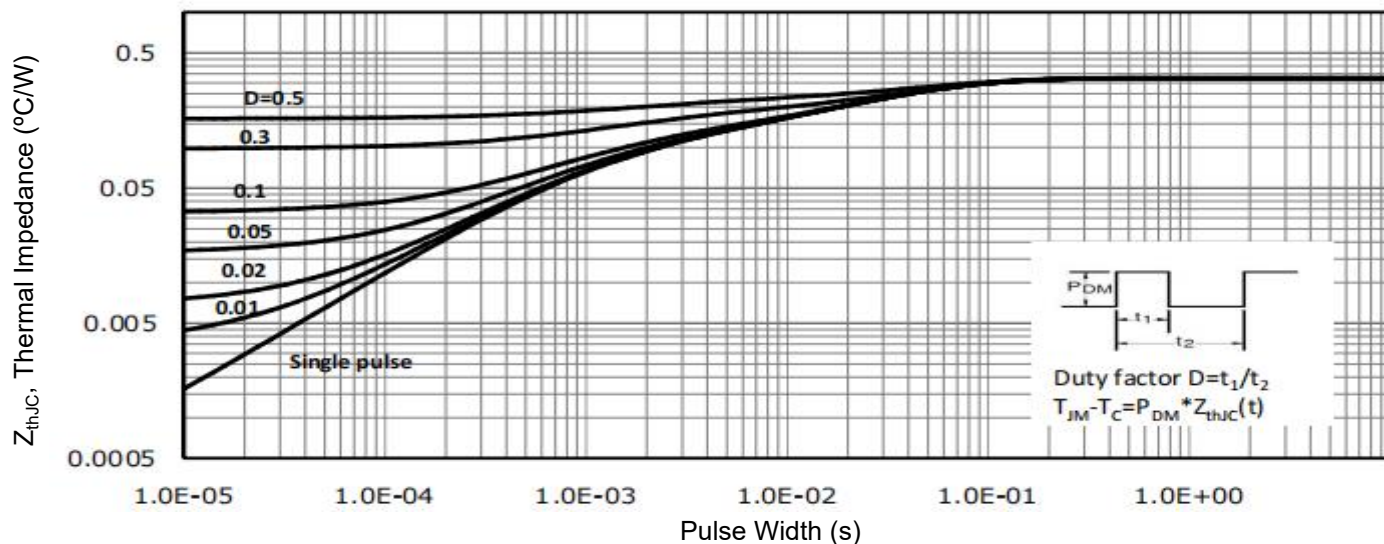
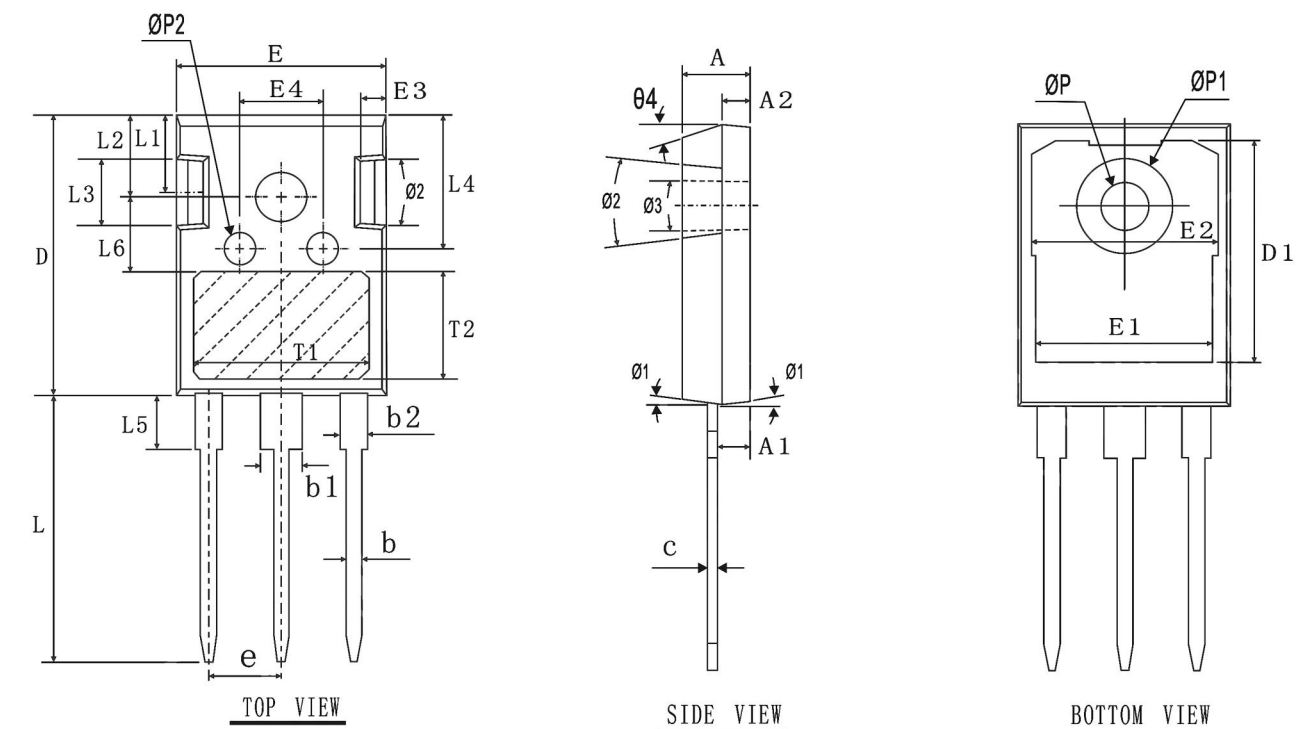


Figure 10. Normalized Maximum Transient Thermal Impedance



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		