N-Channel Enhancement Mode Power MOSFET

Description

The GC085N65QFA uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

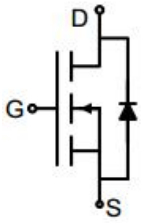
AEC-Q101 Qualified

General Features

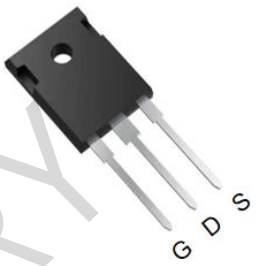
- V_{DS} 650V
- I_D (at V_{GS} = 10V) 40A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 85mΩ
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GC085N65QFA	TO-247	GC085N65F	30pcs/Tube

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Continuous Drain Current	T_C = 25ºC	I_D	40	A
	T_C = 100ºC		25	
Pulsed Drain Current (note1)		I_{DM}	118	A
Gate-Source Voltage		V_{GS}	±30	V
Power Dissipation		P_D	299	W
Single pulse avalanche energy （note2）		E_{AS}	540	mJ
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	45	ºC/W
Maximum Junction-to-Case	R_{thJC}	0.42	ºC/W

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Specifications T_J = 25ºC, 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	--	4.6	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 21.5A	--	72	85	mΩ
Forward Transconductance	g_{FS}	V_{GS} = 20V, I_D = 21.5A	--	30	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 400V, f = 0.8MHz	--	2350	--	pF
Output Capacitance	C_{oss}		--	89	--	
Reverse Transfer Capacitance	C_{rss}		--	22	--	
Total Gate Charge	Q_g	V_{DD} = 480V, I_D = 21.5A, V_{GS} = 10V	--	76	--	nC
Gate-Source Charge	Q_{gs}		--	21	--	
Gate-Drain Charge	Q_{gd}		--	43	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 21.5A, R_G = 27Ω	--	83	--	ns
Turn-on Rise Time	t_r		--	105	--	
Turn-off Delay Time	$t_{d(off)}$		--	243	--	
Turn-off Fall Time	t_f		--	98	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	40	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 21.5A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 21.5A, V_{GS} = 0V di/dt=100A/us	--	0.66	--	μC
Reverse Recovery Time	Trr		--	160	--	ns

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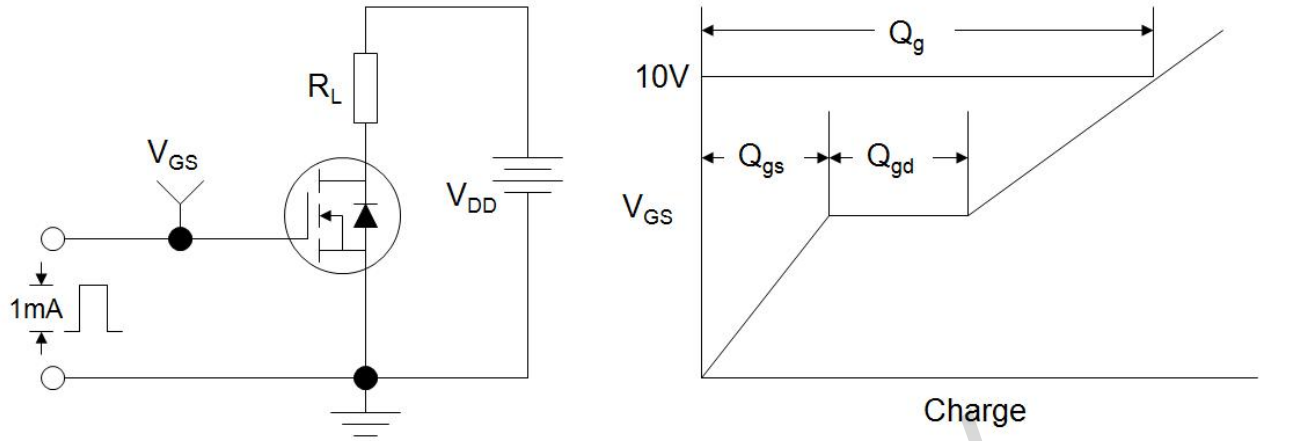
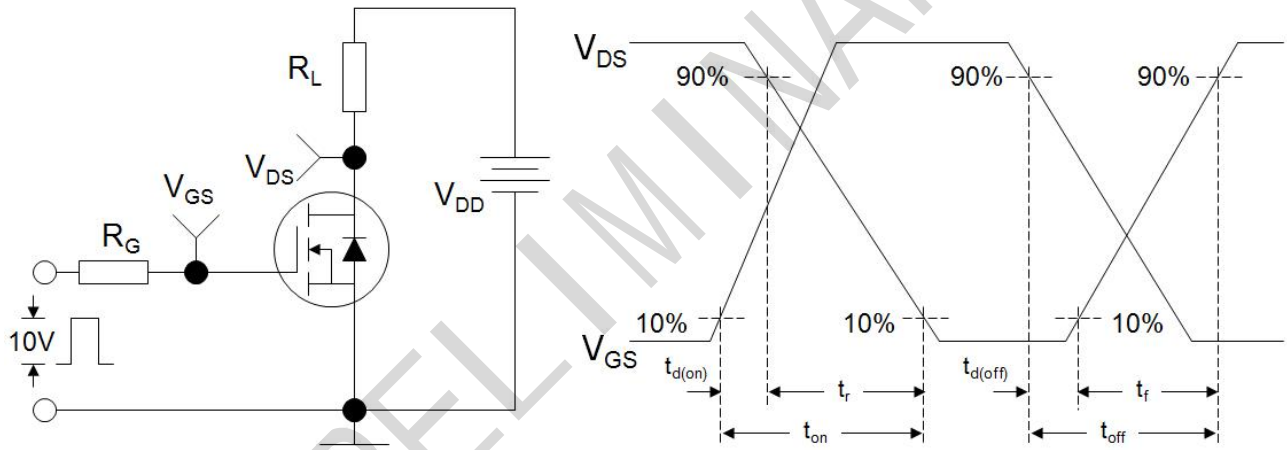
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=50V,VGS=10V,L=10mH,Rg=25Ω
3. Identical low side and high side switch with identical R_G

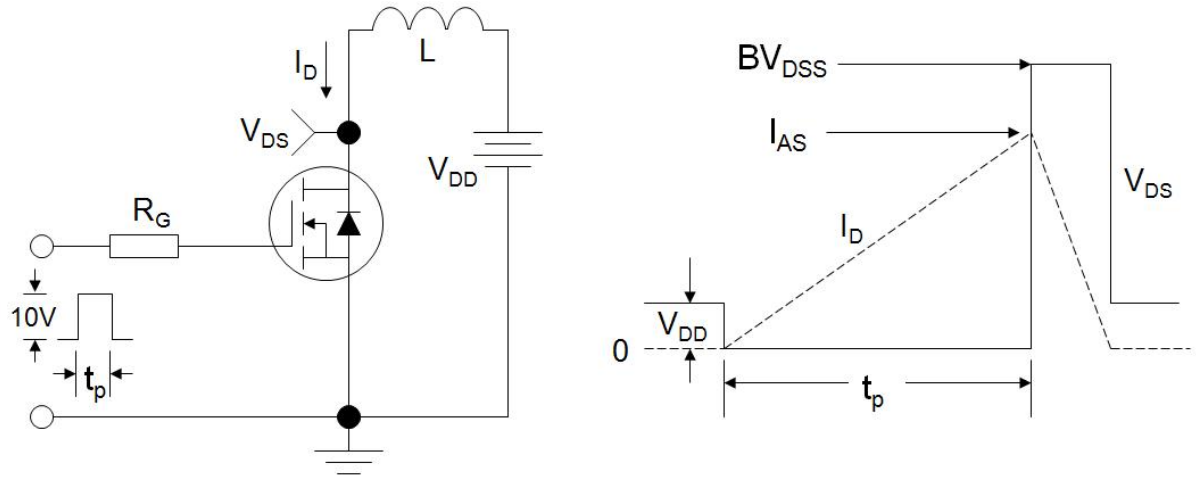
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

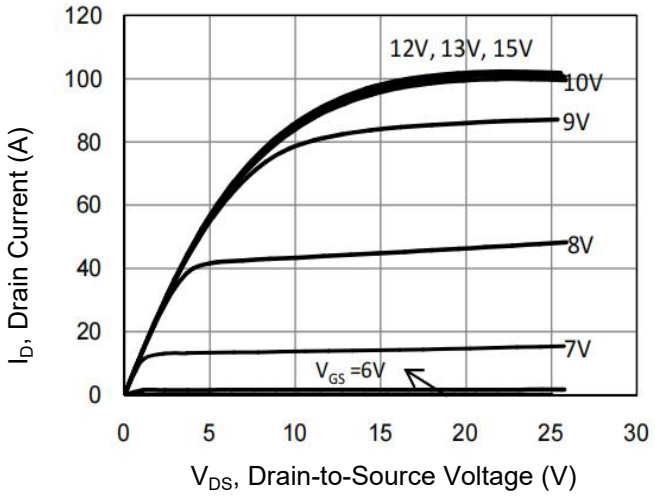


Figure 2. Transfer Characteristics

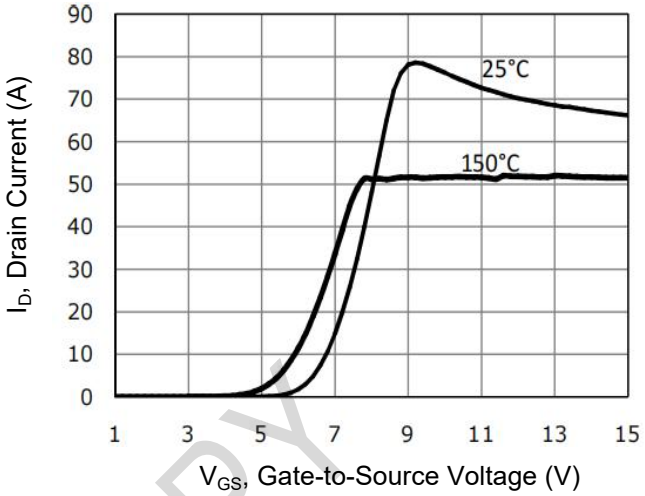


Figure 3. Drain Source On Resistance

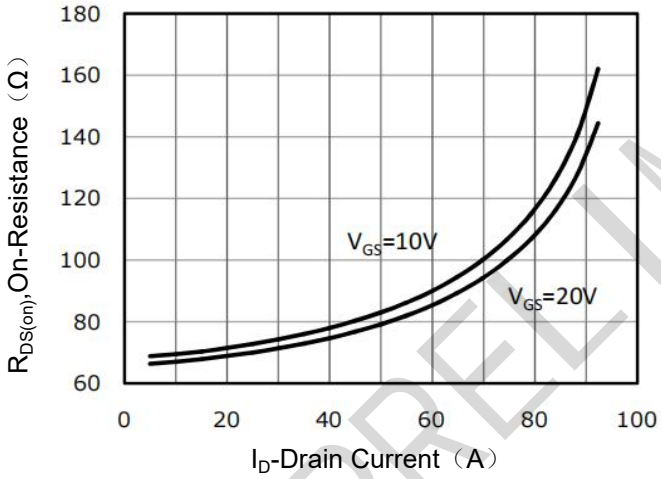


Figure 4. Gate Charge

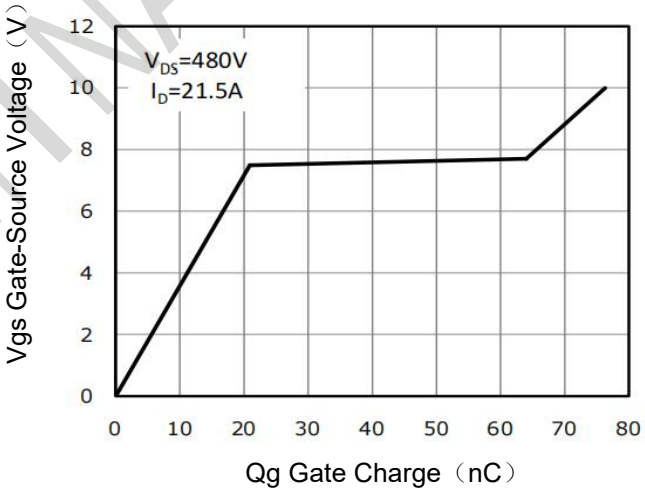


Figure 5. Capacitance

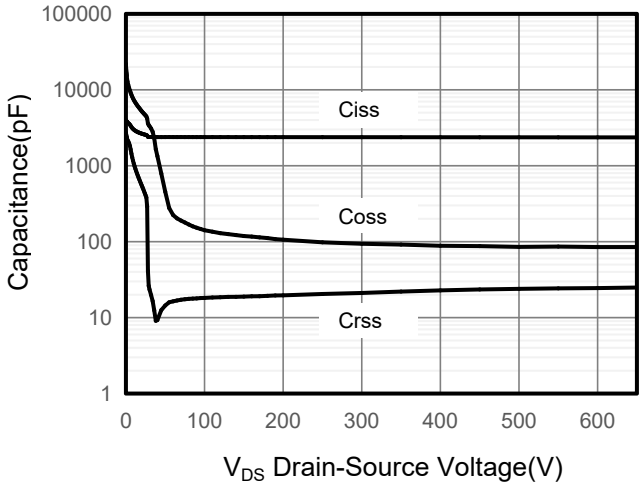
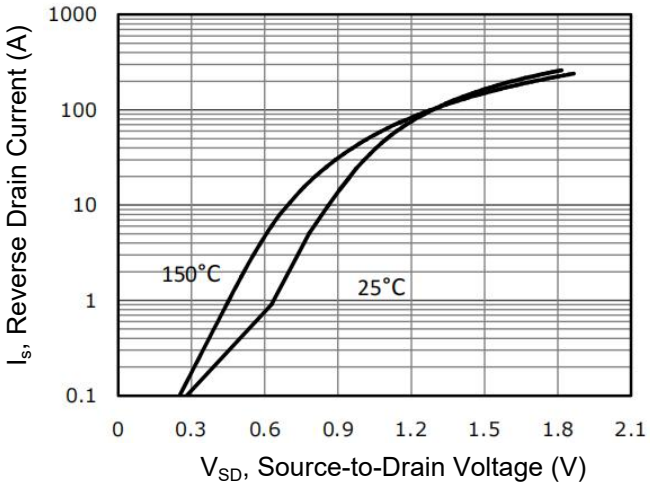


Figure 6. Source-Drain Diode Forward



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Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

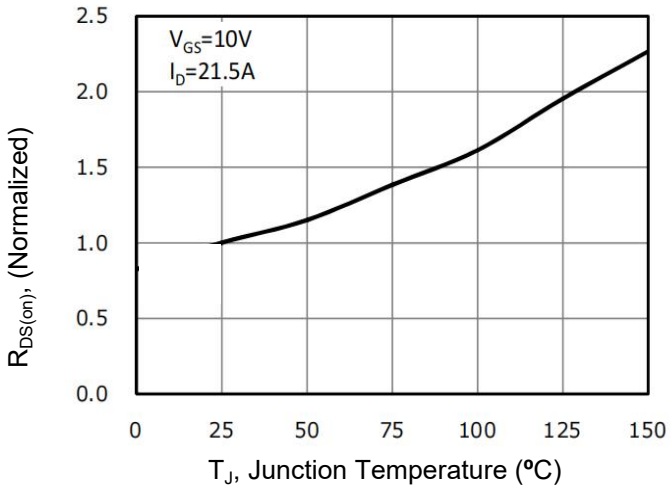

Figure 8. Safe Operation Area

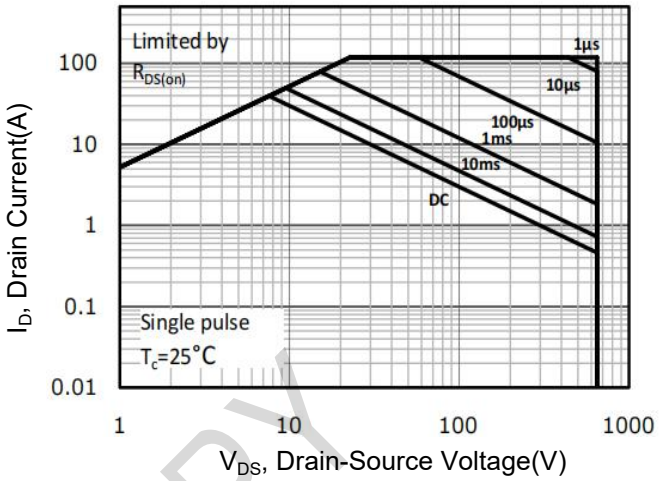

Figure 9. Maximum Continuous Drain Current vs Case Temperature

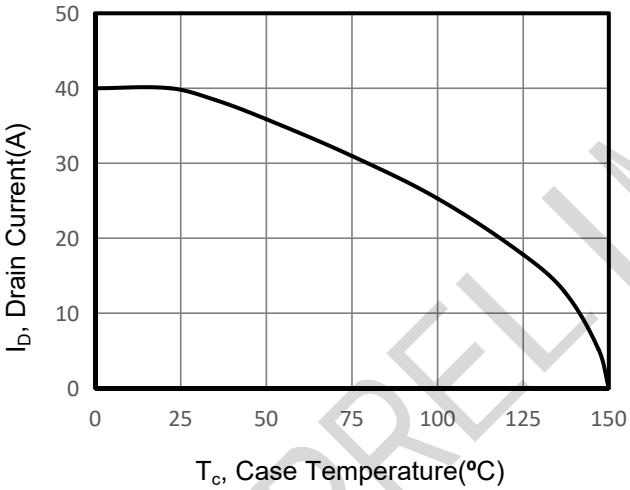

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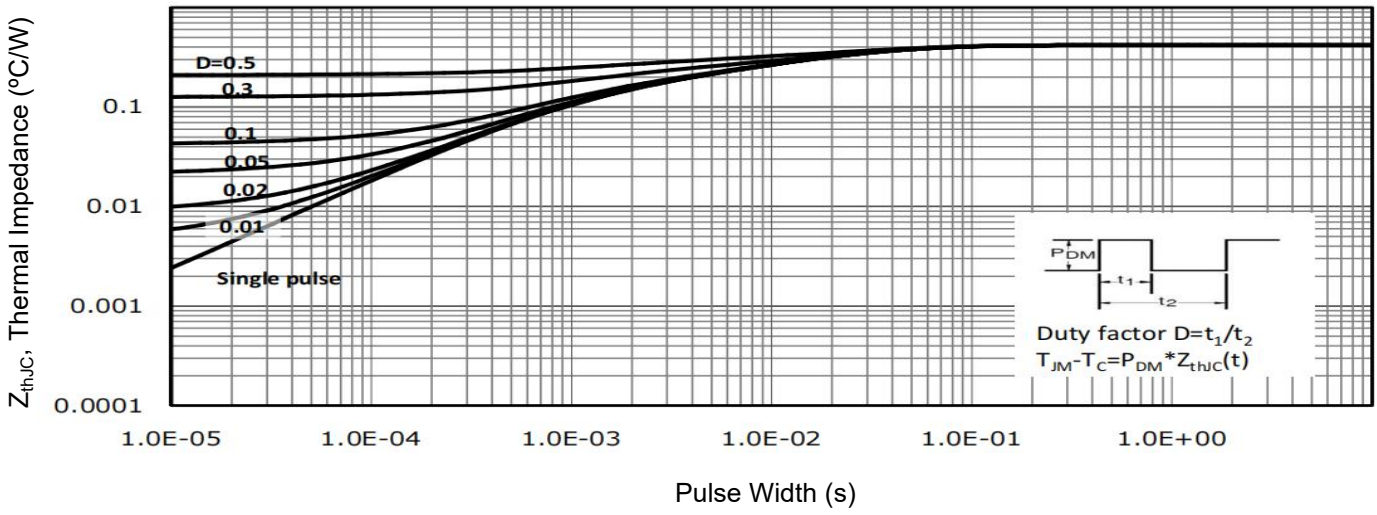
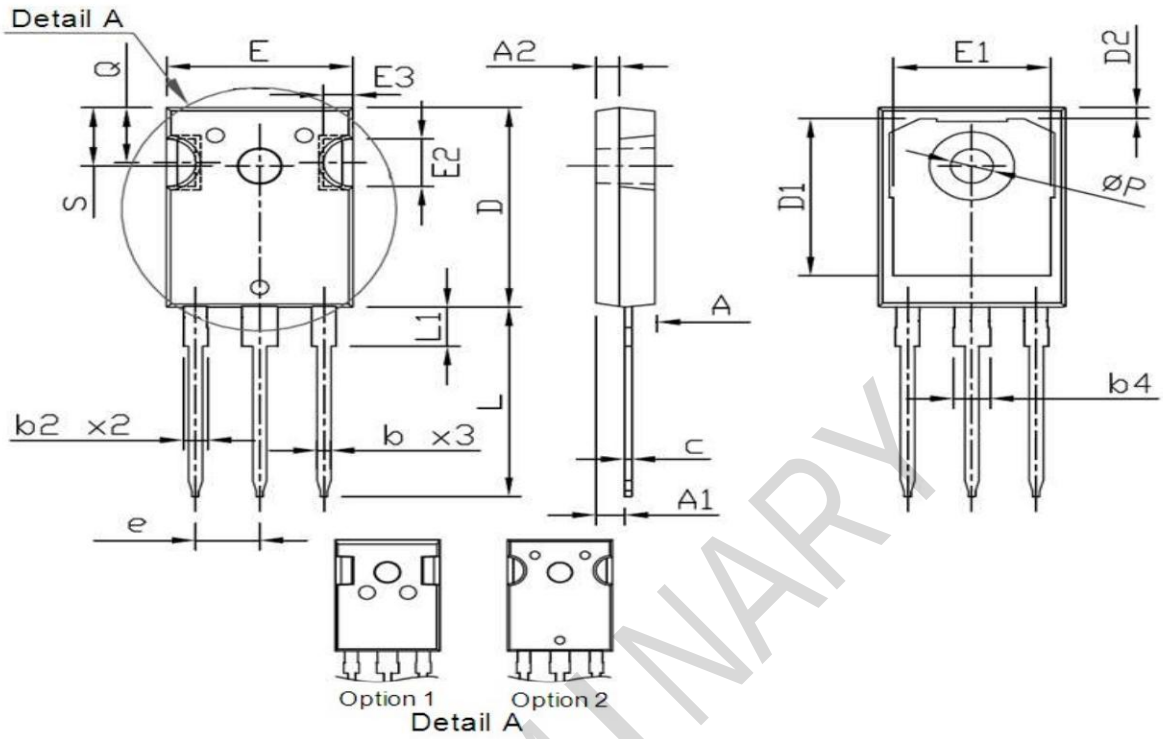
Figure 9. Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.70	5.30	0.185	0.209
A1	2.20	2.60	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	1.04	1.33	0.041	0.052
b2	1.90	2.41	0.075	0.095
b4	2.87	3.43	0.113	0.135
c	0.55	0.70	0.022	0.028
D	20.70	21.30	0.815	0.839
D1	16.25	17.65	0.640	0.695
D2	0.51	1.40	0.020	0.055
e	5.44 BSC.		0.214 BSC.	
E	15.50	16.30	0.610	0.642
E1	13.08	14.16	0.515	0.557
E2	3.80	5.49	0.150	0.216
E3	1.00	2.75	0.039	0.108
L	19.72	20.32	0.776	0.800
L1	3.85	4.50	0.152	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	6.04	6.30	0.238	0.248

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