

TGD N-Channel Enhancement Mode Power MOSFET

Description

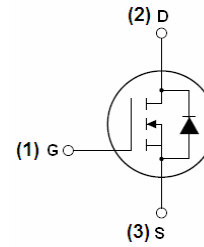
The TGD85H21TC uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

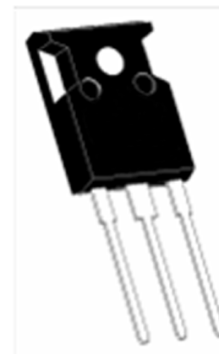
- $V_{DSS} = 85V, I_D = 210A$
 $R_{DS(ON)} < 4.9m\Omega @ V_{GS} = 10V$
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



TO-247 top view

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|---------|----------------|-----------|------------|----------|
| 85H21TC | 85H21TC | TO-247 | - | - | - |

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---------------------|------------|---------------|
| Drain-Source Voltage | V_{DSS} | 85 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 210 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D (100^\circ C)$ | 150 | A |
| Pulsed Drain Current | I_{DM} | 850 | A |
| Maximum Power Dissipation | P_D | 300 | W |
| Derating factor | | 2.0 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 3) | E_{AS} | 1800 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Case ^(Note 1) | $R_{\theta JC}$ | 0.5 | $^\circ C/W$ |
|--|-----------------|-----|--------------|



Electrical Characteristics (T_C=25°C unless otherwise noted)

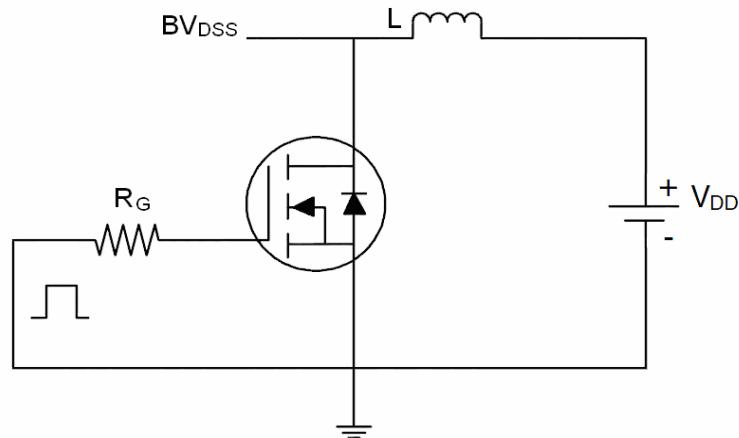
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 85 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =85V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±200 | nA |
| On Characteristics | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 2 | 3.2 | 4 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =40A | - | 4.0 | 4.9 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =10V, I _D =20A | 35 | - | - | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =25V, V _{GS} =0V, F=1.0MHz | - | 7600 | - | PF |
| Output Capacitance | C _{oss} | | - | 720 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 346 | - | PF |
| Switching Characteristics | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =40V, I _D =2A, R _L =15Ω V _{GS} =10V, R _G =2.5Ω | - | 23 | - | nS |
| Turn-on Rise Time | t _r | | - | 124 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 84 | - | nS |
| Turn-Off Fall Time | t _f | | - | 78 | - | nS |
| Total Gate Charge | Q _g | I _D =40A, V _{DD} =40V, V _{GS} =10V | - | 140 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 40 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 57 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =40A | - | - | 1.2 | V |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F = 40A di/dt = 100A/μs ^(Note2) | - | 110 | - | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 300 | - | nC |

Notes:

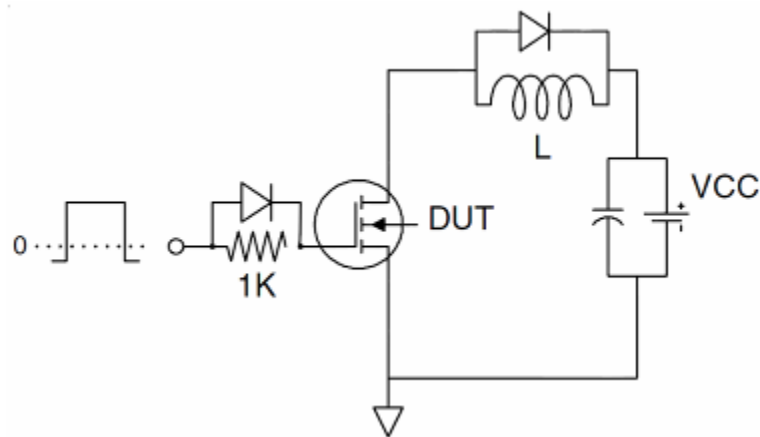
1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.
3. EAS condition: T_J=25°C, V_{DD}=42.5V, V_G=10V, L=2mH, R_G=25Ω, I_{AS}=37A
4. I_{SD}≤125A, di/dt≤260A/μs, V_{DD}≤V_{(BR)DSS}, T_J ≤175°C

Test Circuit

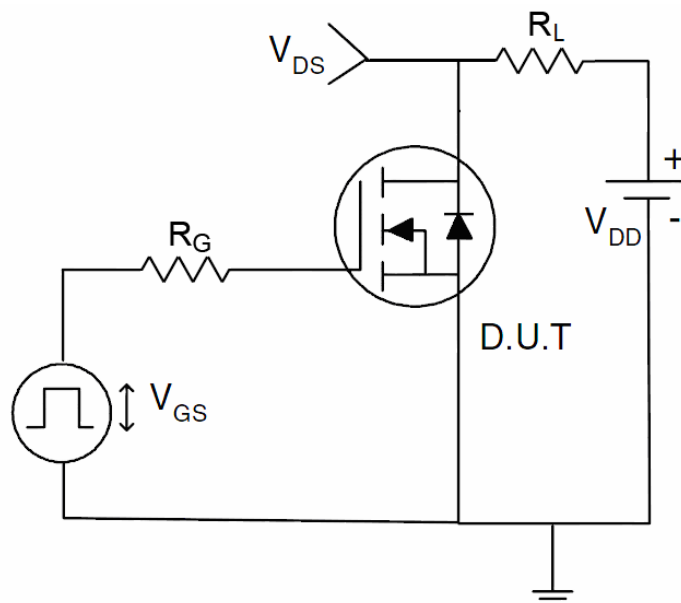
1) E_{AS} test Circuit



2) Gate charge test Circuit

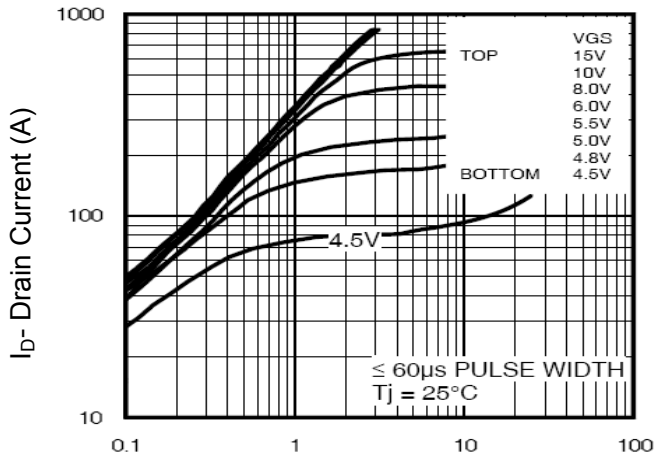


3) Switch Time Test Circuit

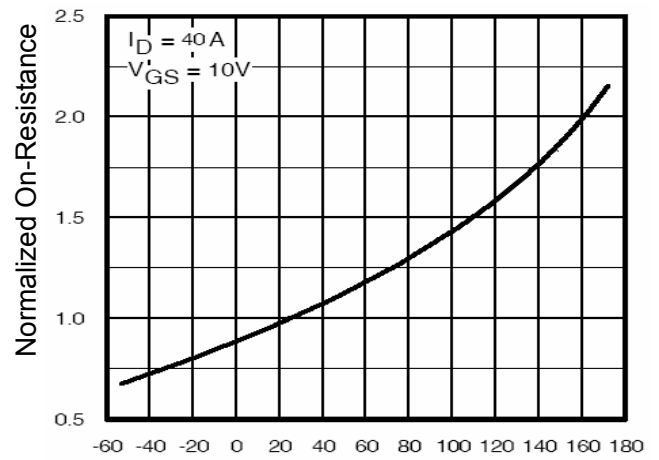




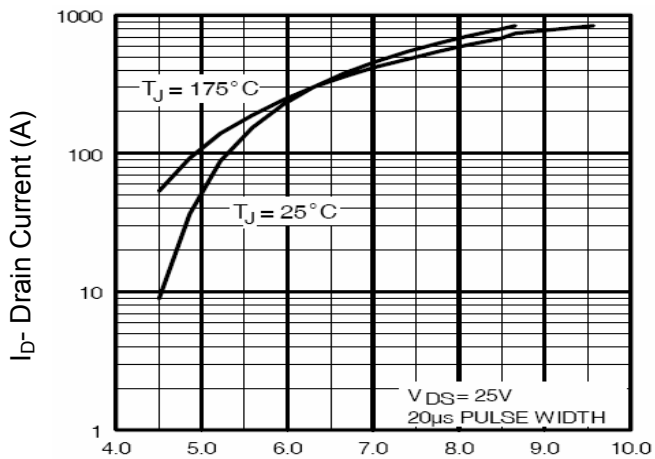
Typical Electrical and Thermal Characteristics



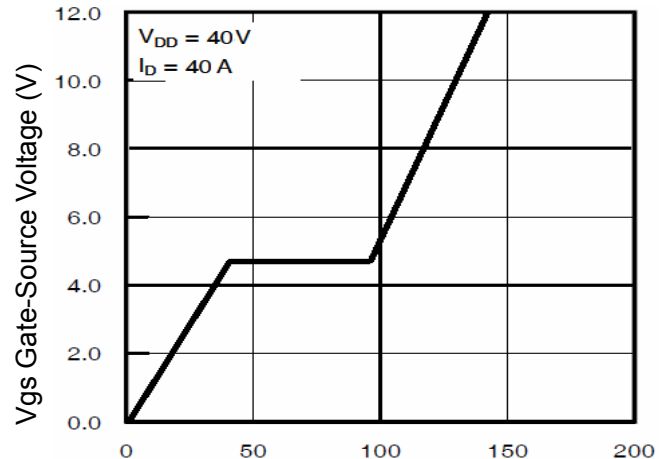
Vds Drain-Source Voltage (V)
Figure 1 Output Characteristics



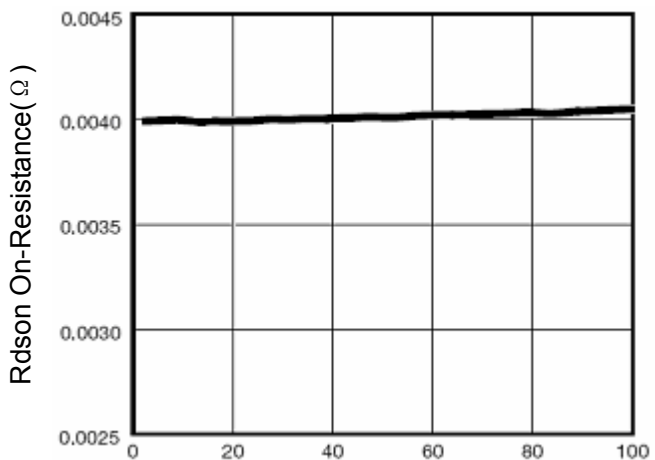
T_J -Junction Temperature($^\circ C$)
Figure 4 Rdson-Junction Temperature



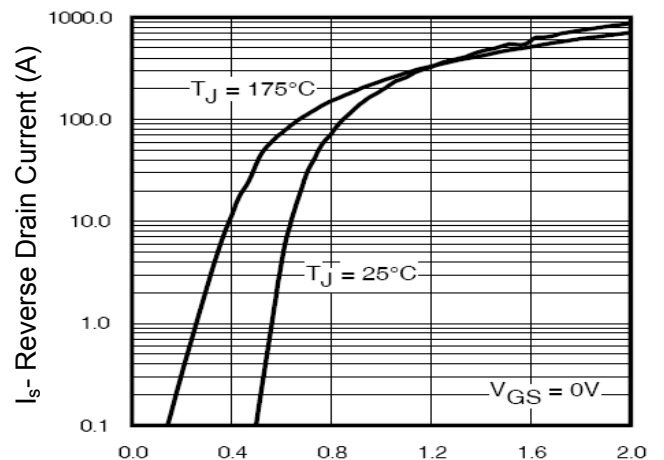
Vgs Gate-Source Voltage (V)
Figure 2 Transfer Characteristics



Qg Gate Charge (nC)
Figure 5 Gate Charge



I_D - Drain Current (A)
Figure 3 Rdson- Drain Current



Vsd Source- Drain Voltage (V)
Figure 6 Source- Drain Diode Forward

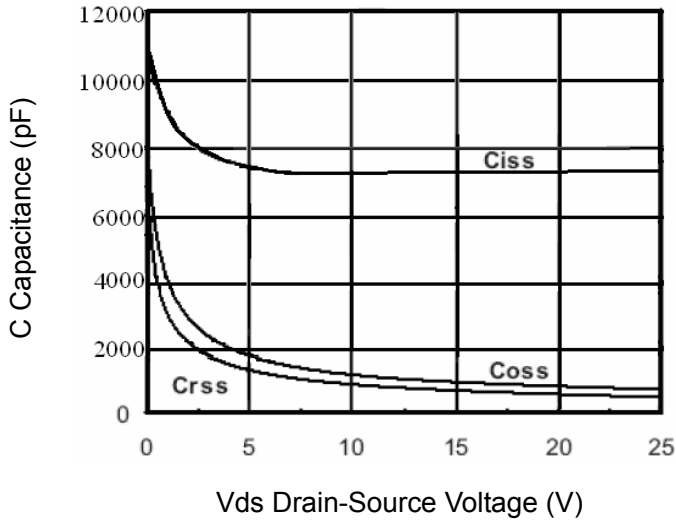


Figure 7 Capacitance vs Vds

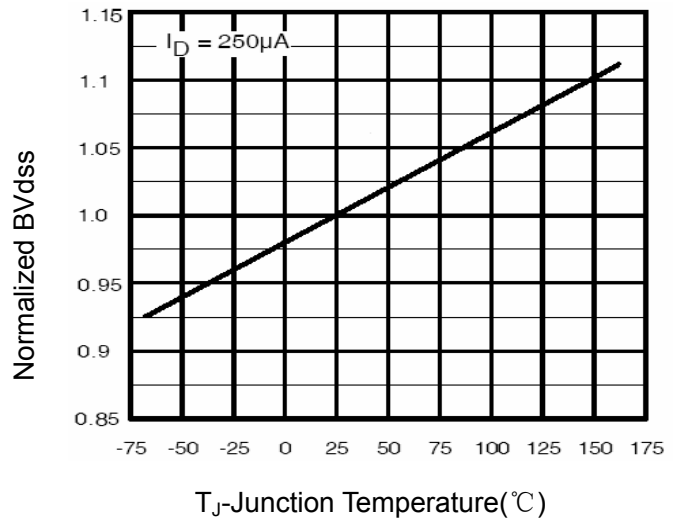


Figure 9 BV_{DSS} vs Junction Temperature

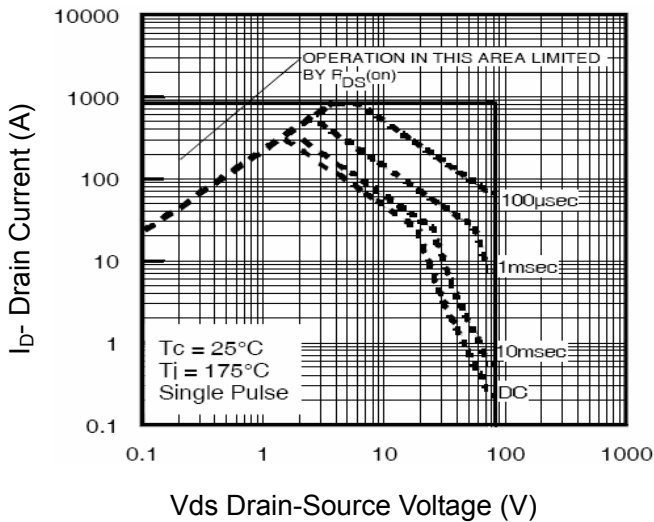


Figure 8 Safe Operation Area

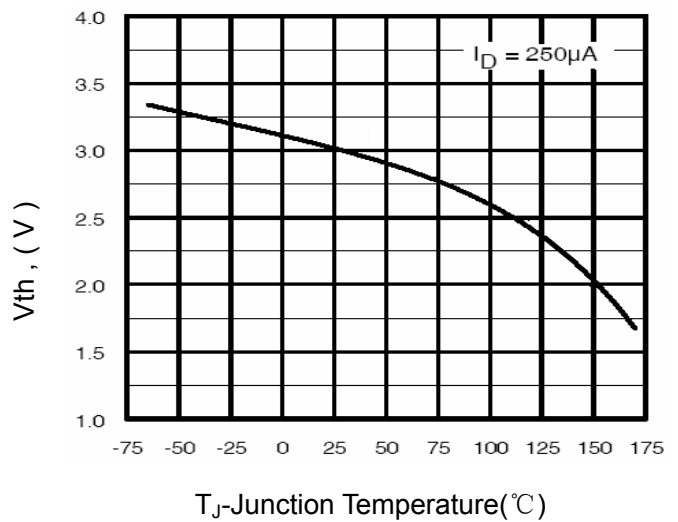


Figure 10 $V_{GS(th)}$ vs Junction Temperature

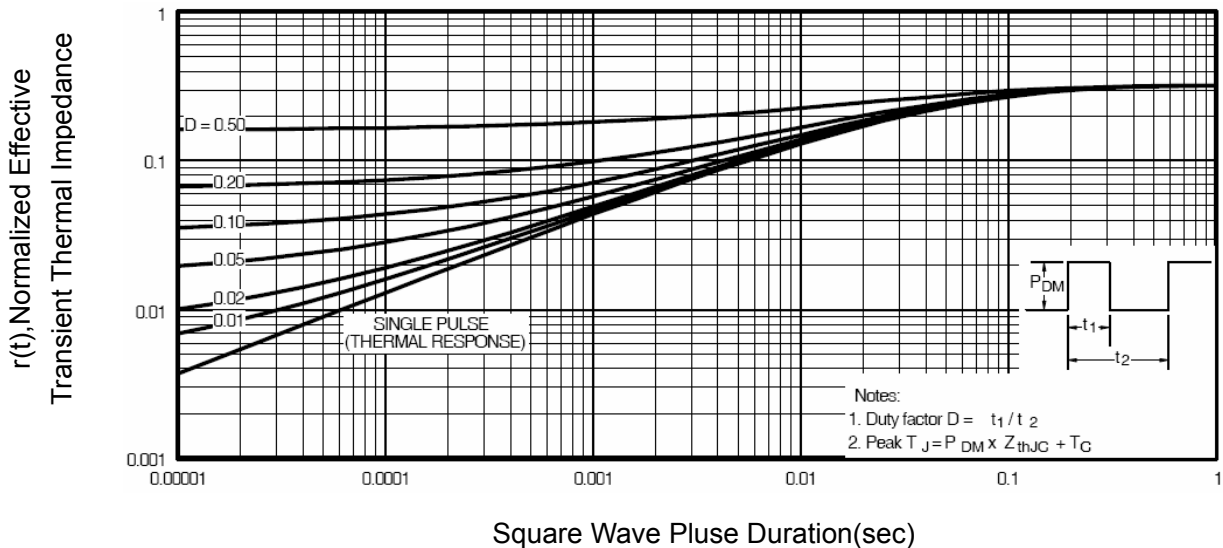
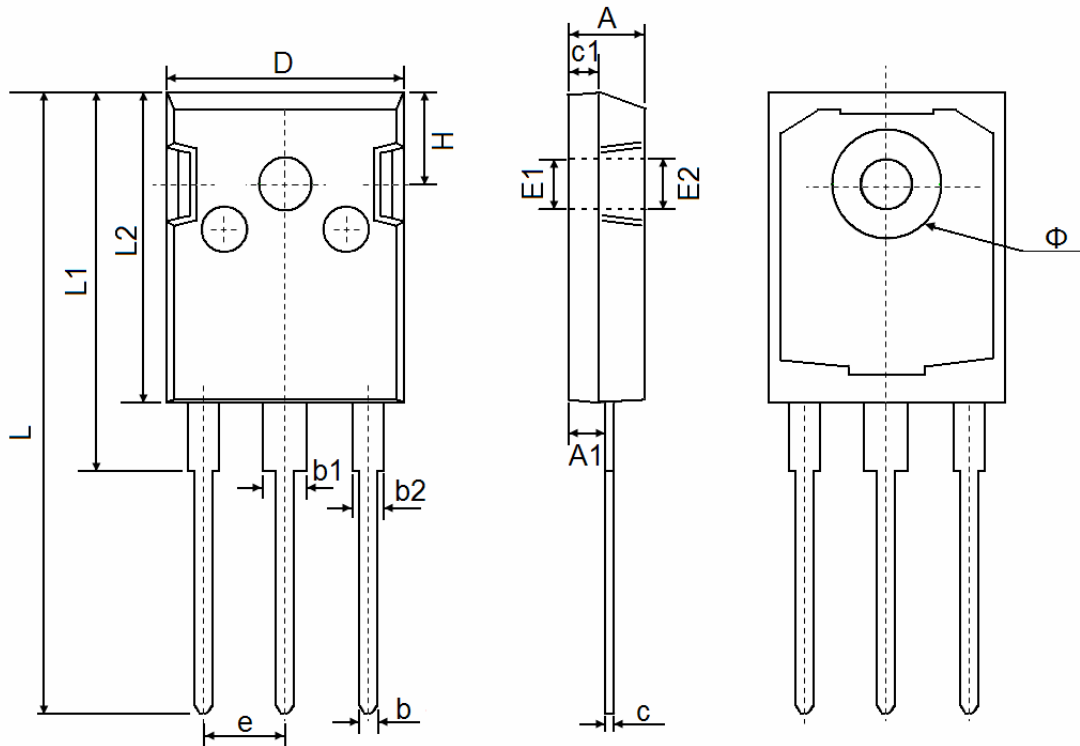


Figure 11 Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.850 | 5.150 | 0.191 | 0.200 |
| A1 | 2.200 | 2.600 | 0.087 | 0.102 |
| b | 1.000 | 1.400 | 0.039 | 0.055 |
| b1 | 2.800 | 3.200 | 0.110 | 0.126 |
| b2 | 1.800 | 2.200 | 0.071 | 0.087 |
| c | 0.500 | 0.700 | 0.020 | 0.028 |
| c1 | 1.900 | 2.100 | 0.075 | 0.083 |
| D | 15.450 | 15.750 | 0.608 | 0.620 |
| E1 | 3.500 REF | | 0.138 REF | |
| E2 | 3.600 REF | | 0.142 REF | |
| L | 40.900 | 41.300 | 1.610 | 1.626 |
| L1 | 24.800 | 25.100 | 0.976 | 0.988 |
| L2 | 20.300 | 20.600 | 0.799 | 0.811 |
| Φ | 7.100 | 7.300 | 0.280 | 0.287 |
| e | 5.450 TYP | | 0.215 TYP | |
| H | 5.980 REF | | 0.235 REF | |