

APG029N06

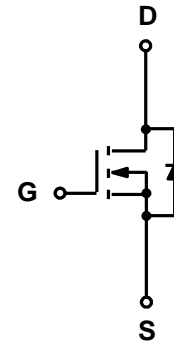
N-Channel Enhancement Mosfet

Features

- 60V,160A
 $R_{DS(ON)} < 2.9m\Omega @ V_{GS}=10V$ TYP:2.4m Ω
 $R_{DS(ON)} < 3.6m\Omega @ V_{GS}=4.5V$ TYP:3.0m Ω
- Super Trench
- Extremely low on-resistance RDS(on)
- Excellent Qg x RDS(on) product(FOM)
- Qualified according to JEDEC criteria

Applications

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- UPS (Uninterruptible Power Supplies)



Marking and pin assignment

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|-----------|----------------|-----------|------------|----------------|
| G029N06 | APG029N06 | TO-220 | - | - | 1000 |

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit | |
|--|------------------|-----------|------|---|
| Drain-Source Voltage | V _{DS} | 60 | V | |
| Gate-Source Voltage | V _{GS} | ±20 | V | |
| Continuous Drain Current (Silicon Limited) | I _D | Tc=25°C | 160 | A |
| | | Tc=100°C | 101 | A |
| Continuous Drain Current (Package Limited) Tc=25°C | | 80 | A | |
| Pulsed Drain Current | I _{DM} | 640 | A | |
| Single Pulsed Avalanche Energy (Tc=25°C, L=0.3mH) ⁽²⁾ | E _{AS} | 189 | mJ | |
| Drain Power Dissipation | P _D | 113 | W | |
| Thermal Resistance from Junction to Case | R _{θJC} | 1.11 | °C/W | |
| Thermal Resistance- Junction to Ambient | R _{θJA} | 62.5 | °C/W | |
| Junction Temperature | T _J | 150 | °C | |
| Storage Temperature | T _{STG} | -55~ +150 | °C | |

MOSFET ELECTRICAL CHARACTERISTICS($T_J=25^\circ\text{C}$ unless otherwise noted)

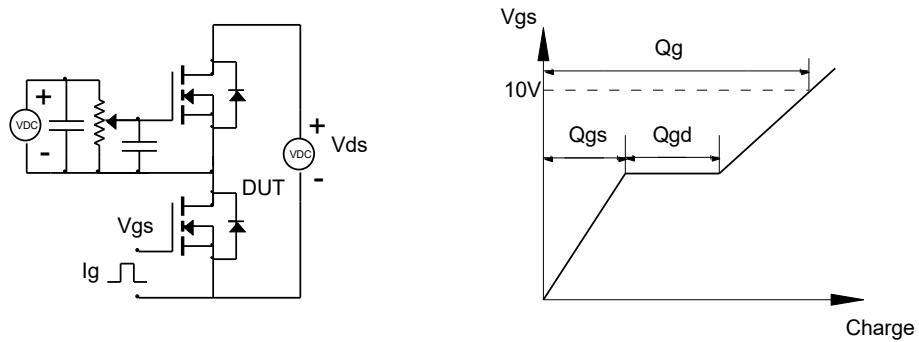
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|--|-----|----------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 60 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 60V, V_{GS} = 0V$ | - | 0.02 | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | ± 10 | ± 100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.2 | - | 2.2 | V |
| Drain-source on-resistance ^(a) | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 40A$ | - | 2.4 | 2.9 | m Ω |
| | | $V_{GS} = 4.5V, I_D = 32A$ | | 3.0 | 3.6 | m Ω |
| Gate Resistance | R_g | $V_{GS}=0V, V_{DS}$ Open, $f=1MHz$ | | 0.93 | | Ω |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 30V, V_{GS} = 0V, f = 1.0MHz$ | - | 4610 | 6915 | pF |
| Output Capacitance | C_{oss} | | - | 2188 | 3282 | |
| Reverse Transfer Capacitance | C_{rss} | | - | 66 | 132 | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=30V, I_D=40A, R_G=2.7\Omega,$ $V_G=10V$ | - | 14.1 | - | ns |
| Turn-on rise time | t_r | | - | 63.7 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 46.8 | - | |
| Turn-off fall time | t_f | | - | 105.1 | - | |
| Total Gate Charge | Q_g | $V_{DS}=30V, I_D=40A,$ $V_{GS}=10V$ | - | 74.4 | 111.6 | nC |
| Gate-Source Charge | Q_{gs} | | - | 17.3 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 9.5 | 18.9 | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ^(a) | V_{SD} | $T_J=25^\circ\text{C}, V_{GS} = 0V, I_S=40A$ | - | 0/82 | 1.23 | V |
| Diode Forward current | I_S | $T_C=25^\circ\text{C}$ | - | - | 160 | A |
| Body Diode Reverse Recovery Time | t_{rr} | $T_J=25^\circ\text{C}, I_F=40A, di/dt=300A/us$ | | 52.8 | 105.6 | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | $T_J=25^\circ\text{C}, I_F=440A, di/dt=300A/us$ | | 253 | 56.3 | nc |

Notes:

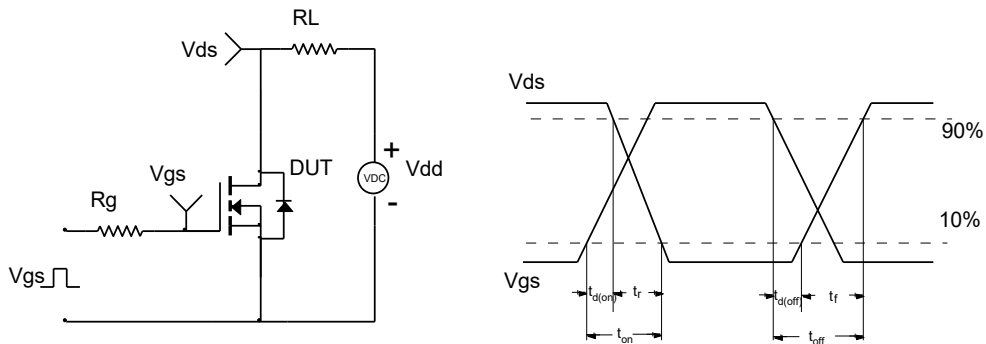
- a) Pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$
b) Guaranteed by design, not subject to production testing

Test Circuit

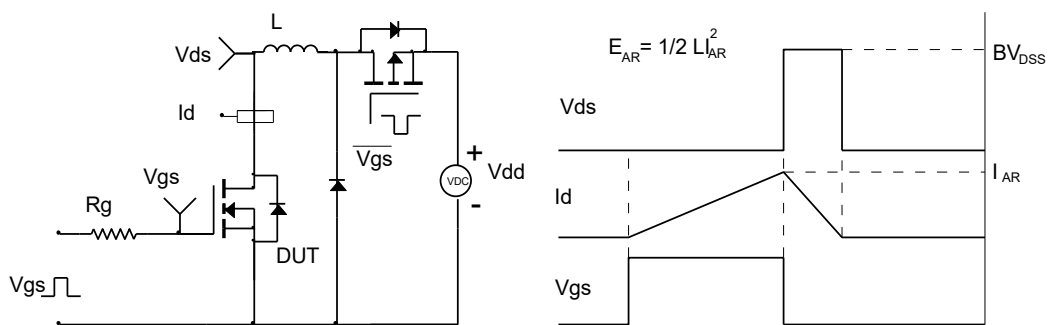
Gate Charge Test Circuit & Waveform



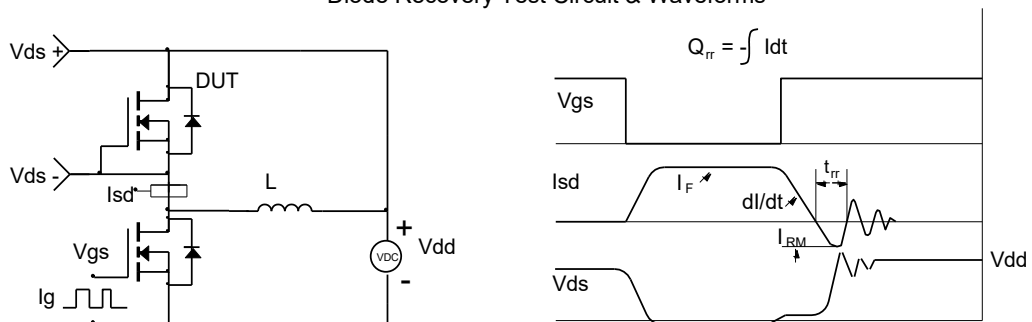
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Fig 1: Output Characteristics

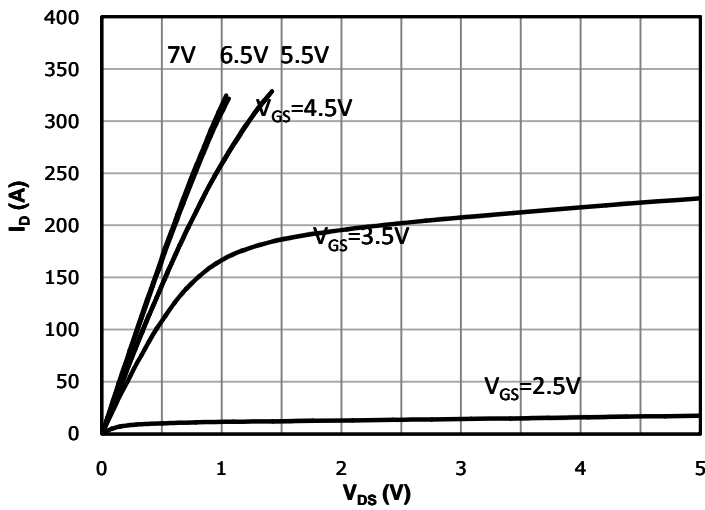


Fig 2: Transfer Characteristics

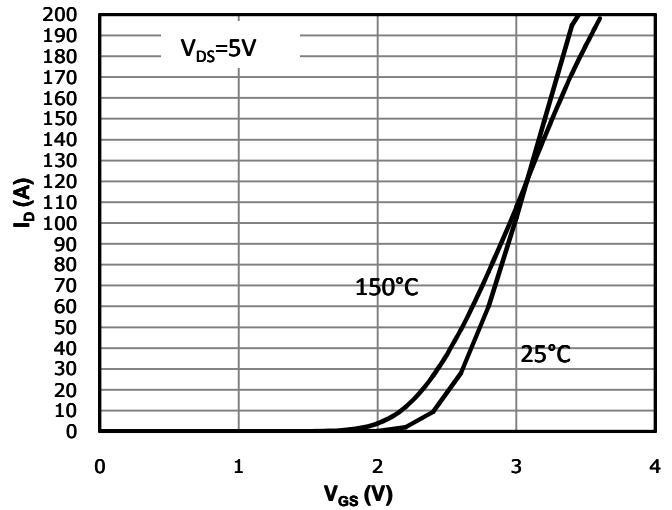


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

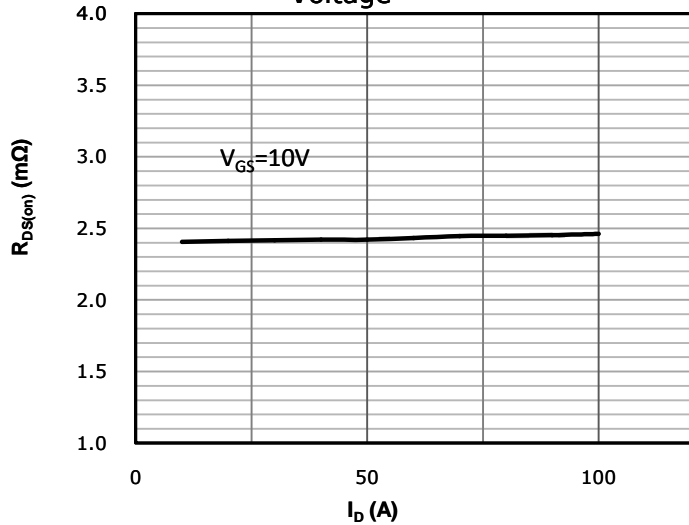


Fig 4: $R_{DS(on)}$ vs Gate Voltage

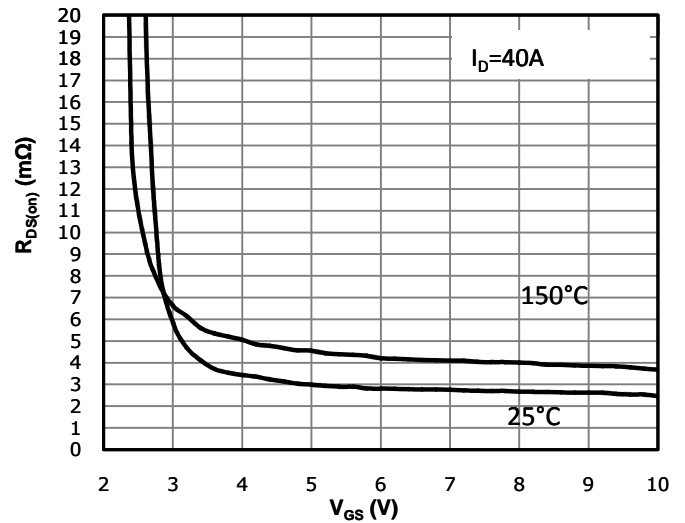


Fig 5: $R_{DS(on)}$ vs. Temperature

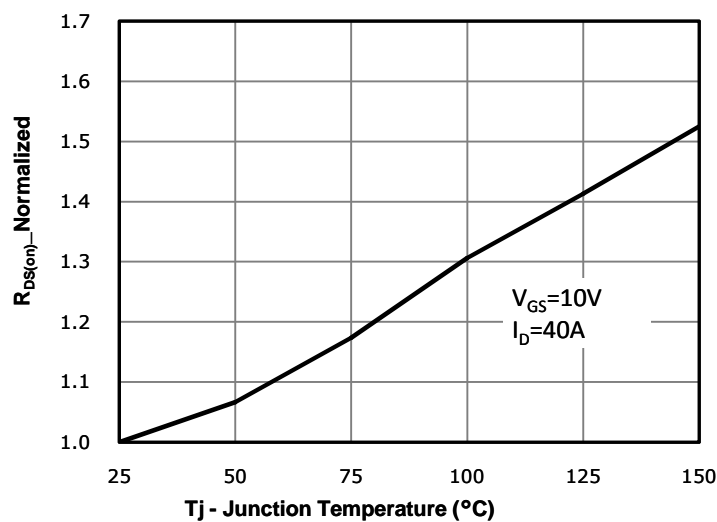
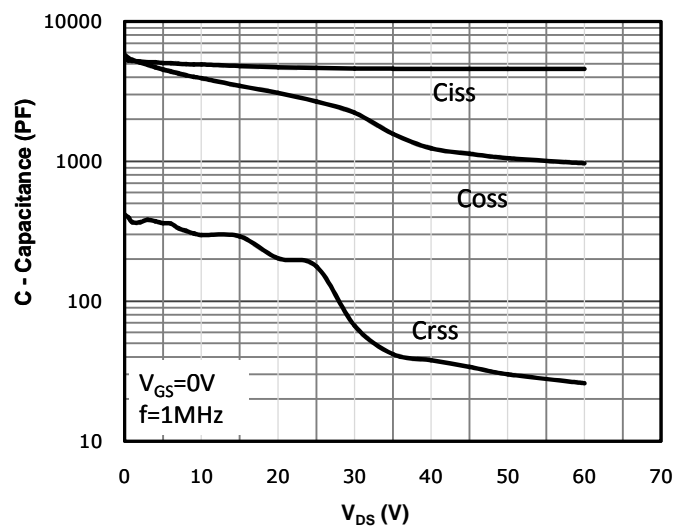


Fig 6: Capacitance Characteristics



Typical Performance Characteristics

Fig 7: Gate Charge Characteristics

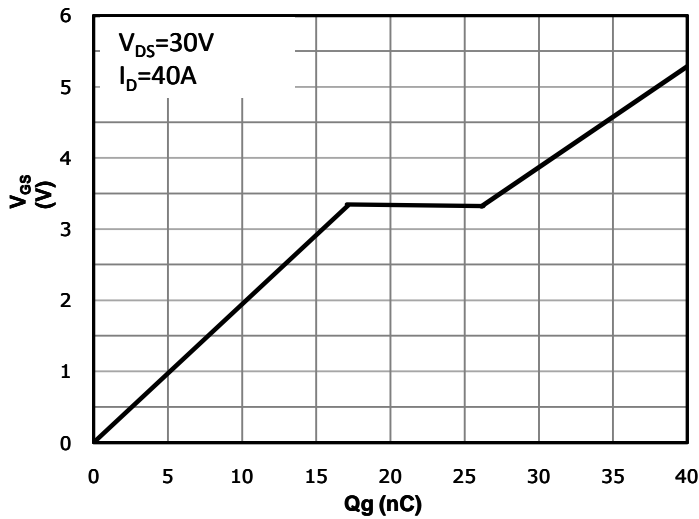


Fig 8: Body-diode Forward Characteristics

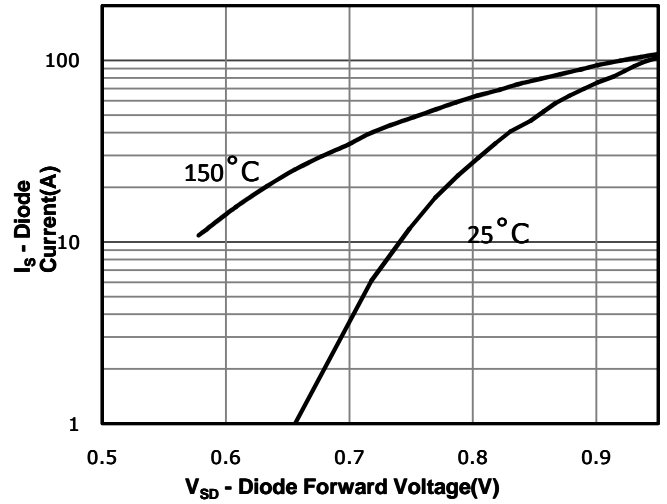


Fig 9: Power Dissipation

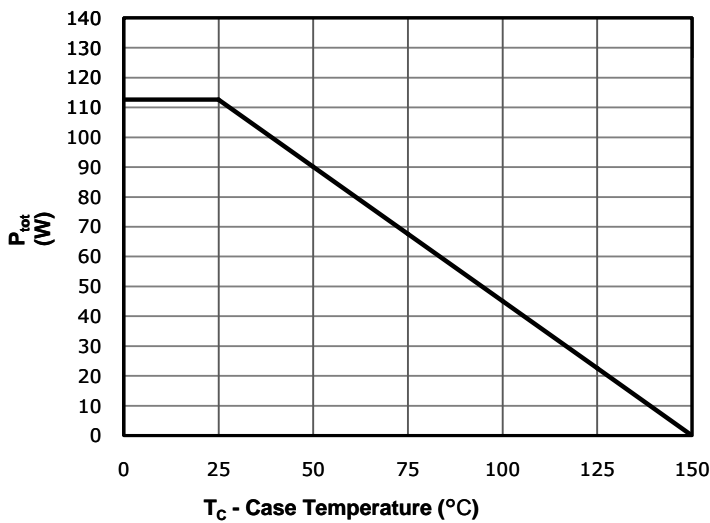


Fig 10: Drain Current Derating

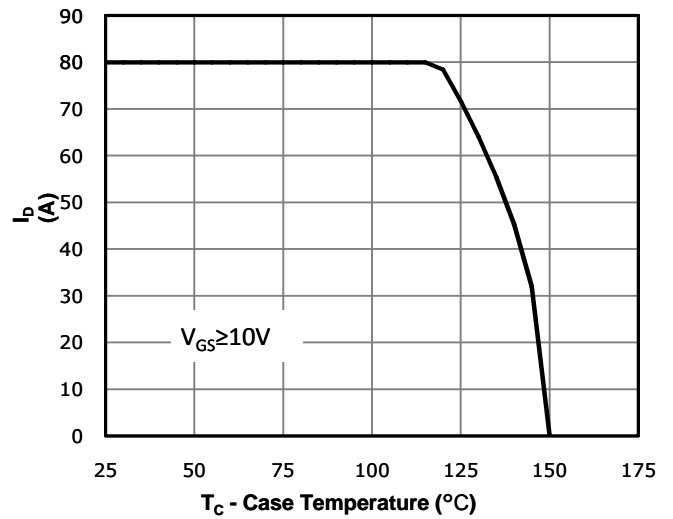
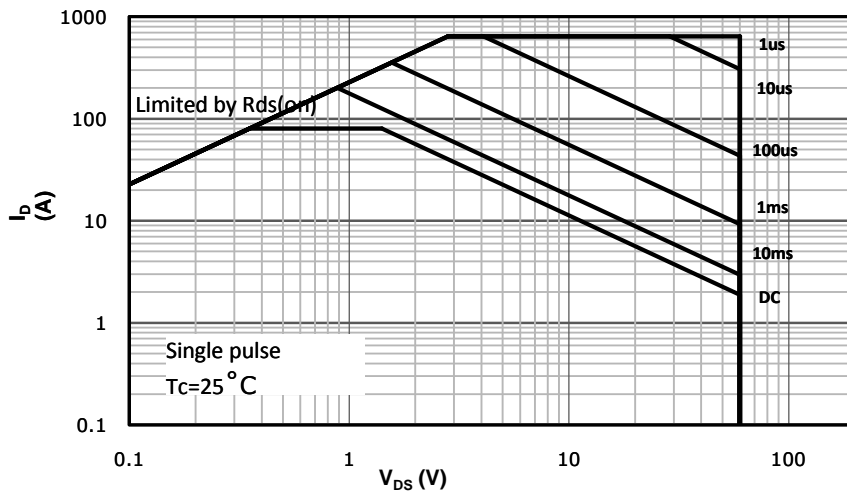
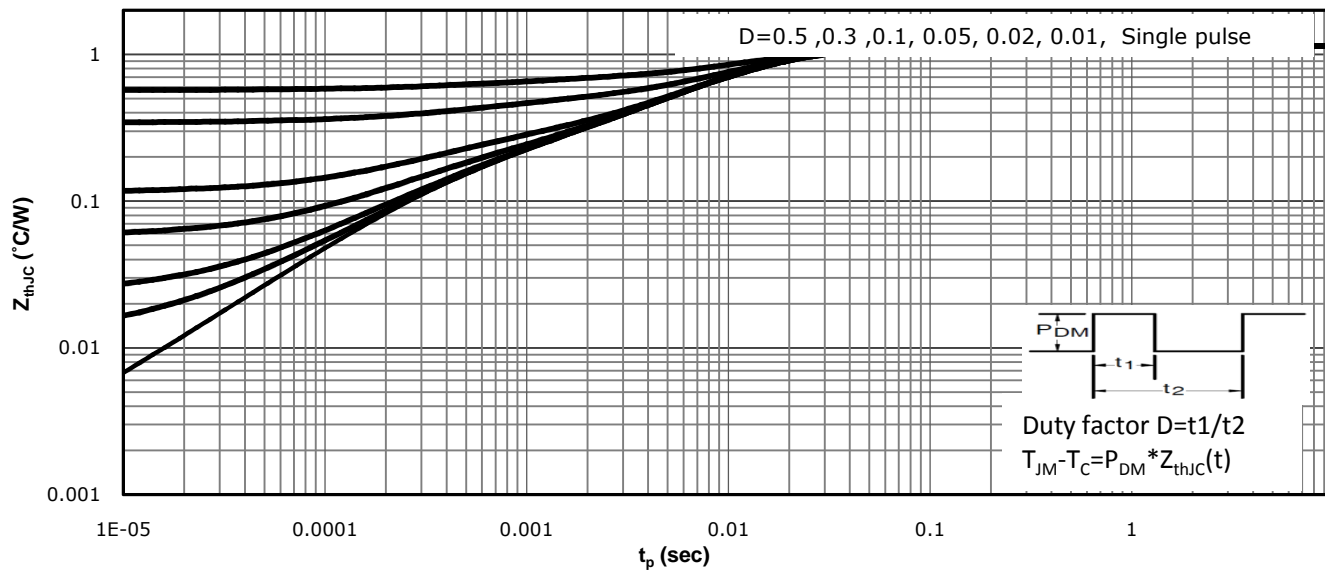


Fig 11: Safe Operating Area



Typical Performance Characteristics

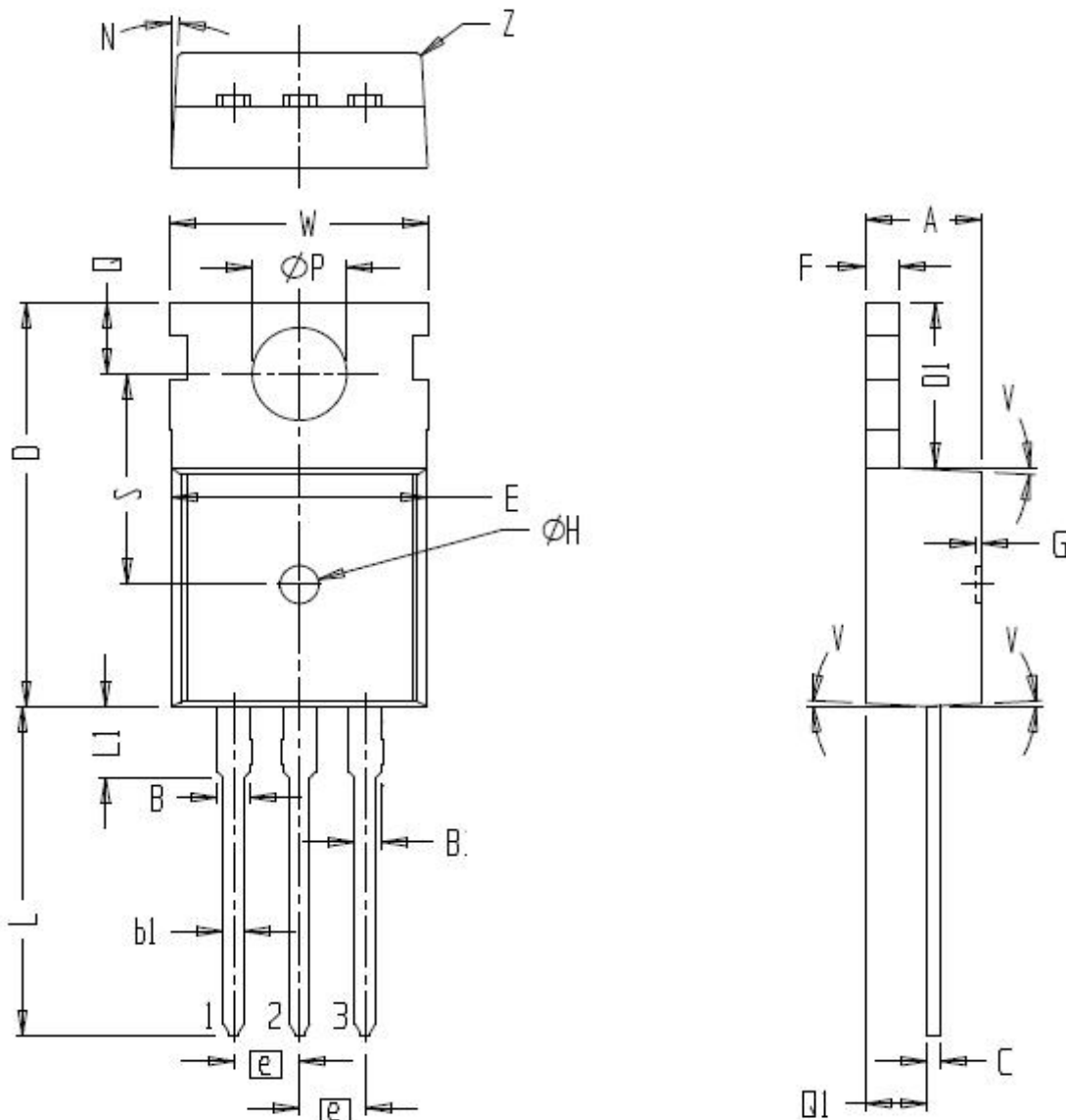
Fig 12: Max. Transient Thermal Impedance



TO-220 Package Information

UNIT: mm

| SYMBOL | min | nom | max | SYMBOL | min | nom | max |
|--------|-------|-------|-------|--------|-------|-------|-------|
| A | 4.10 | 4.50 | 4.90 | E | 9.40 | 9.90 | 10.40 |
| B | 1.25 | 1.40 | 1.55 | e | | 2.54 | |
| B1 | 0.95 | 1.10 | 1.25 | F | 1.15 | 1.30 | 1.45 |
| b1 | 0.65 | 0.80 | 0.95 | L | 12.00 | 13.00 | 14.00 |
| c | 0.40 | 0.50 | 0.60 | L1 | 2.50 | 3.00 | 3.50 |
| D | 14.90 | 15.90 | 16.90 | Q | 2.30 | 2.80 | 3.30 |
| D1 | 6.00 | 6.50 | 7.00 | Q1 | 1.90 | 2.40 | 2.90 |
| W | 9.80 | 10.00 | 10.20 | φP | 3.41 | 3.66 | 3.91 |
| S | | 8.30 | | Z | 0 | | 0.20 |
| φH | | 1.50 | | N | | 3 ° | |
| G | | 0.10 | | V | | 3 ° | |



Revision History

| Revision | Release | Remark |
|----------|------------|-----------------|
| V1.0 | 2023/05/17 | Initial Release |

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.