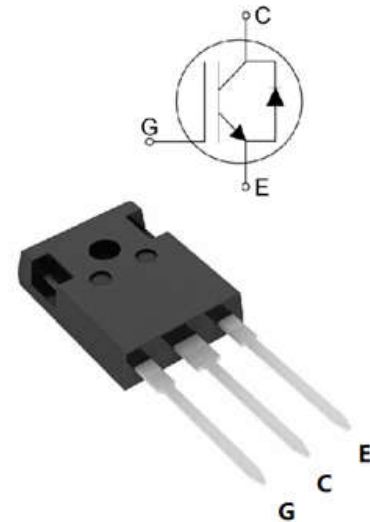


FEATURES

- High breakdown voltage up to 650V for improved reliability
- Trench-Stop Technology offering :
 - High speed switching
 - High ruggedness, temperature stable
 - Short circuit withstand time – 5μs
 - Low V_{CEsat}
 - Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Enhanced avalanche capability

| | | |
|-----------------------------|-------------|----------|
| V_{CE} | 650 | V |
| I_C | 30 | A |
| $V_{CE(SAT)} \quad I_C=30A$ | 1.90 | V |



APPLICATION

- Uninterruptible Power Supplies
- Inverter
- Welding Converters
- PFC applications
- Converter with high switching frequency

| | | |
|------------|---------|-----------|
| Product | Package | Packaging |
| HMG30N65FT | TO247 | Tube |

Maximum Ratings (T_j= 25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|--|------------------|------------|------|
| Collector-Emitter Breakdown Voltage | V _{CE} | 650 | V |
| DC collector current, limited by T _{jmax} T _C = 25°C T _C = 100°C | I _C | 60 30 | A |
| Diode Forward current, limited by T _{jmax} T _C = 25°C T _C = 100°C | I _F | 60 30 | A |
| Continuous Gate-emitter voltage | V _{GE} | ±20 | V |
| Transient Gate-emitter voltage | V _{GE} | ±30 | V |
| Turn off safe operating area V _{CE} ≤ 650V, T _j ≤ 150°C, t _p = 1μs | - | 90 | A |
| Pulse collector current, V _{GE} = 15V, t _p limited by T _{jmax} | I _{CM} | 90 | A |
| Short Circuit Withstand Time, V _{GE} = 15V, V _{CE} ≤ 400V | T _{sc} | 5 | μs |
| Power dissipation , T _j =25°C | P _{tot} | 155 | W |
| Operating junction temperature | T _j | -40...+150 | °C |
| Storage temperature | T _s | -55...+150 | °C |
| Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s | - | 260 | °C |

Thermal Resistance

| Parameter | Symbol | Max. Value | Unit |
|--|---------------------|------------|------|
| IGBT thermal resistance, junction - case | R _{θ(j-c)} | 0.8 | K/W |
| Diode thermal resistance, junction - case | R _{θ(j-c)} | 1.1 | K/W |
| Thermal resistance, junction - ambient | R _{θ(j-a)} | 40 | K/W |

Electrical Characteristics (T_j= 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--------------------------------------|----------------------|---|--------|-------------|------------|--------|
| Static | | | | | | |
| Collector-Emitter Breakdown Voltage | BV _{CES} | V _{GE} =0V, I _C =250uA | 650 | | - | V |
| Gate Threshold Voltage | V _{GE(th)} | V _{GE} =V _{CE} , I _C =250uA | 4.0 | 4.6 | 5.2 | V |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | V _{GE} =15V, I _C =30A T _j = 25°C T _j = 150°C | - - | 1.90 2.5 | 2.3 | V V |
| Zero gate voltage collector current | I _{CES} | V _{CE} = 650V, V _{GE} = 0V T _j = 25°C T _j = 150°C | | 0.1 | 40 1000 | μA |
| Gate-emitter leakage current | I _{GES} | V _{CE} = 0V, V _{GE} = ±20V | | | 100 | nA |
| Transconductance | g _{fs} | V _{CE} = 20V, I _C = 30A | - | 15 | - | S |

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---------------------------------|---------------------|--|-----|------|-----|------|
| Dynamic | | | | | | |
| Input capacitance | C _{ies} | V _{CE} = 30V, V _{GE} = 0V, f = 1MHz | | 1840 | | pF |
| Output capacitance | C _{oes} | | | 90 | | |
| Reverse transfer capacitance | C _{res} | | | 40 | | |
| Gate charge | Q _G | V _{CC} = 520V, I _C = 30A, V _{GE} = 15V | - | 110 | - | nC |
| Short circuit collector current | I _{C (SC)} | V _{GE} =15V, t _{SC} ≤ 5us V _{CC} =400V, T _{j, start} =25°C | - | 160 | - | A |

Switching Characteristic, Inductive Load

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|--------------|---|-----|-----|-----|------|
| Dynamic $T_J=25^{\circ}\text{C}$ | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 400\text{V}, I_C = 30.0\text{A},$ $V_{GE} = 0.0/15.0\text{V},$ $R_g=20\Omega$ | - | 30 | - | ns |
| Rise Time | t_r | | - | 25 | - | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 140 | - | ns |
| Fall Time | t_f | | - | 70 | - | ns |
| Turn-on Energy | E_{on} | | - | 1.6 | - | mJ |
| Turn-off Energy | E_{off} | | - | 0.2 | - | mJ |

Electrical Characteristics of the DIODE ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--------------------------|----------|---|-----|------|-----|------|
| Dynamic | | | | | | |
| Diode Forward Voltage | V_{FM} | $I_F = 30\text{A}$ | - | 1.65 | - | V |
| Reverse Recovery Time | T_{rr} | $I_F = 30\text{A},$ $V_R = 300\text{V},$ $di/dt = 600\text{A}/\mu\text{s},$ | - | 80 | - | ns |
| Reverse Recovery Current | I_{rr} | | - | 10 | - | A |
| Reverse Recovery Charge | Q_{rr} | | - | 700 | - | nC |

Fig. 1 FBSOA characteristics

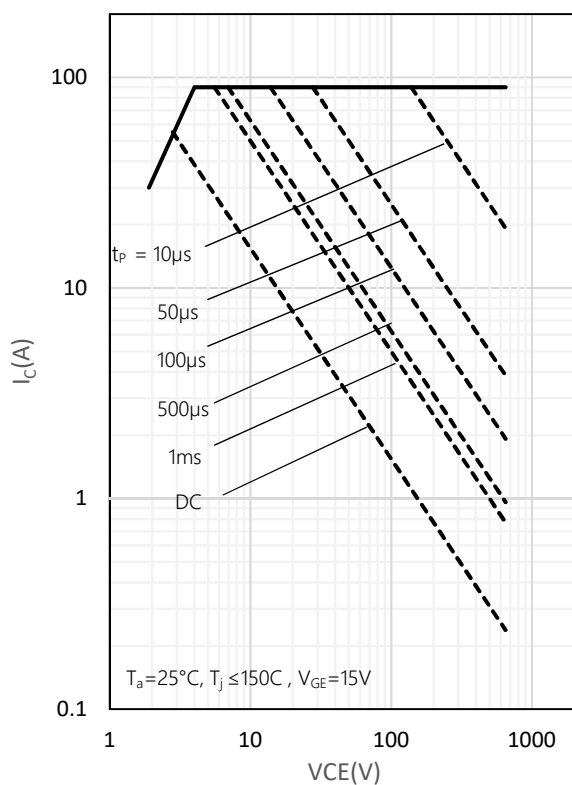


Fig. 2 Load Current vs. Frequency

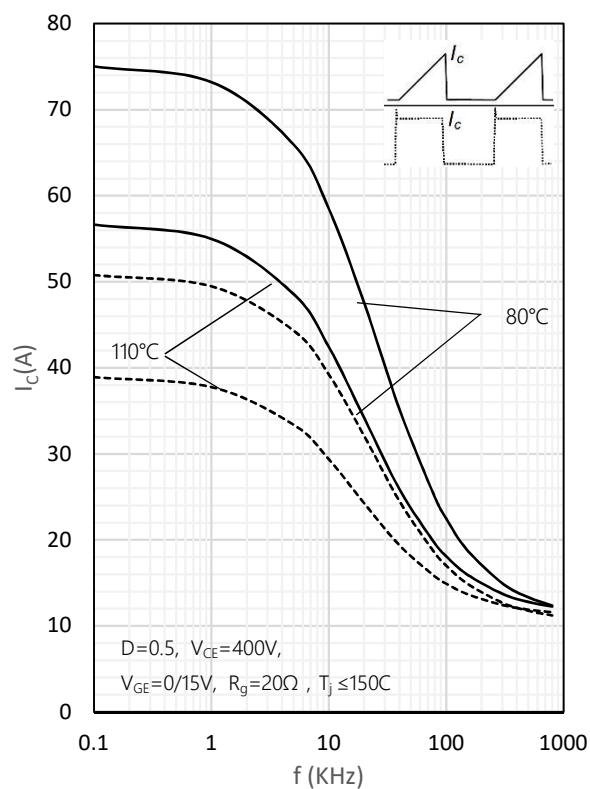


Fig. 3 Output characteristics

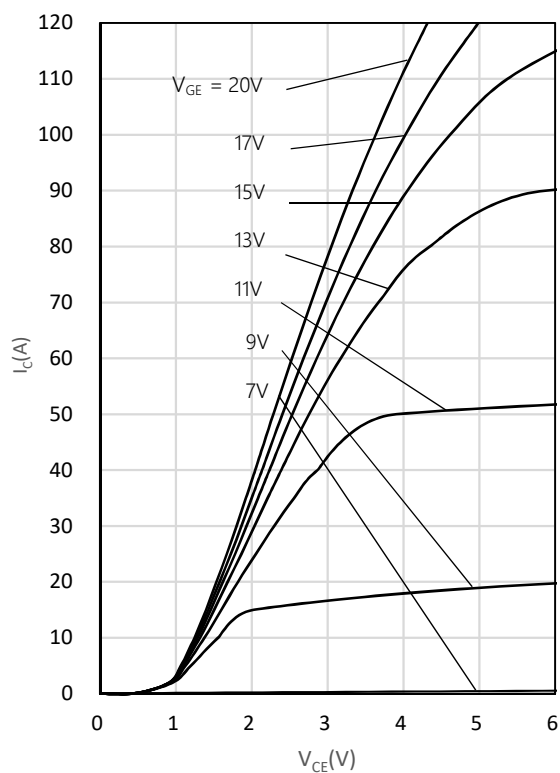


Fig. 4 Saturation voltage characteristics

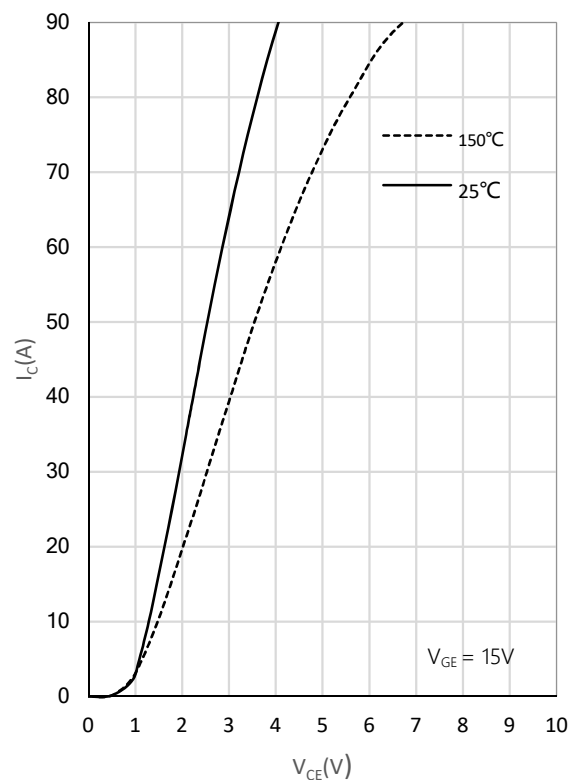


Fig. 5 Switching times vs. gate resistor

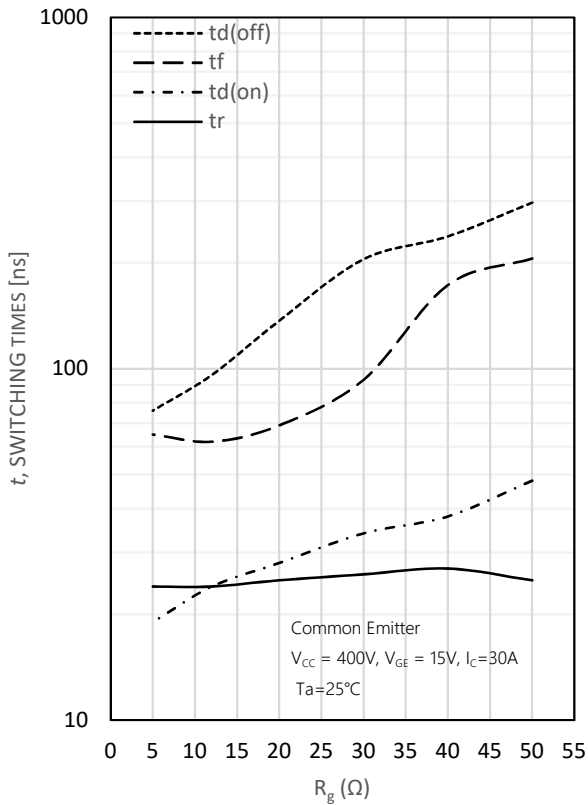


Fig. 6 Switching times vs. collector current

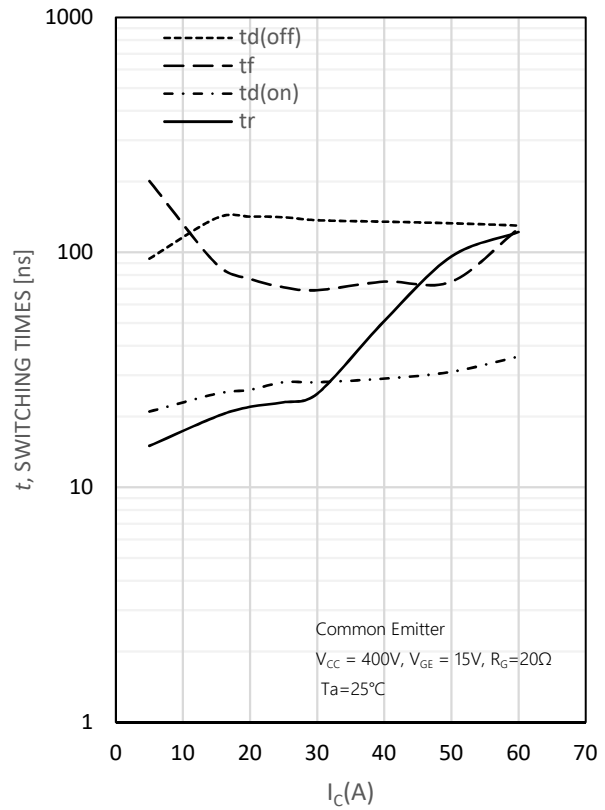


Fig. 7 Switching loss vs. gate resistor

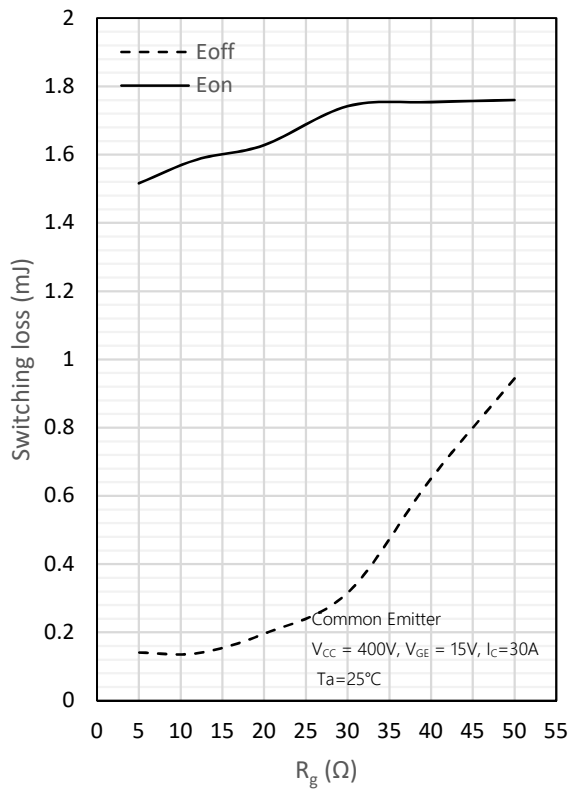


Fig. 8 Switching loss vs. collector current

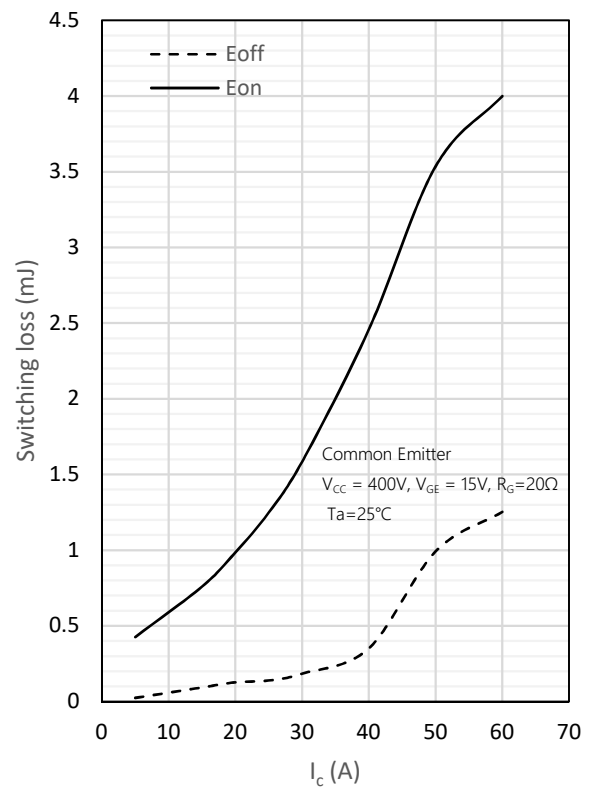


Fig. 9 Gate charge characteristics

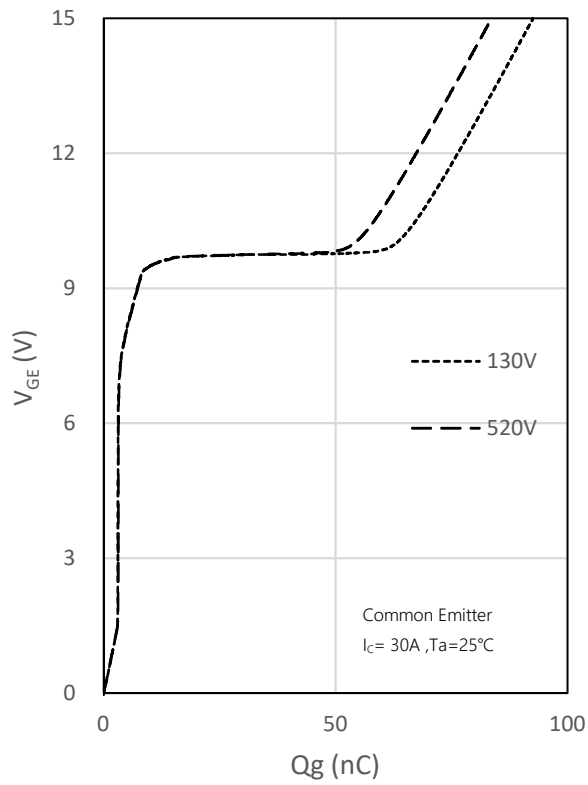
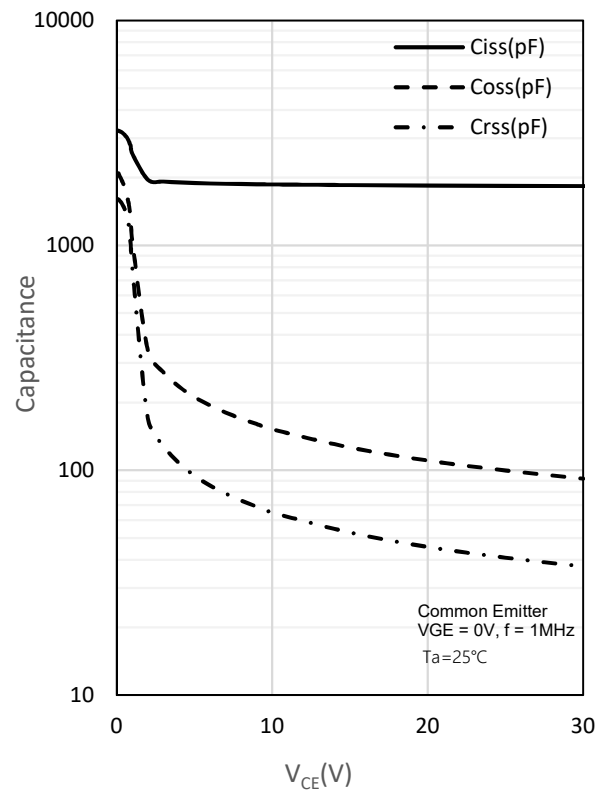
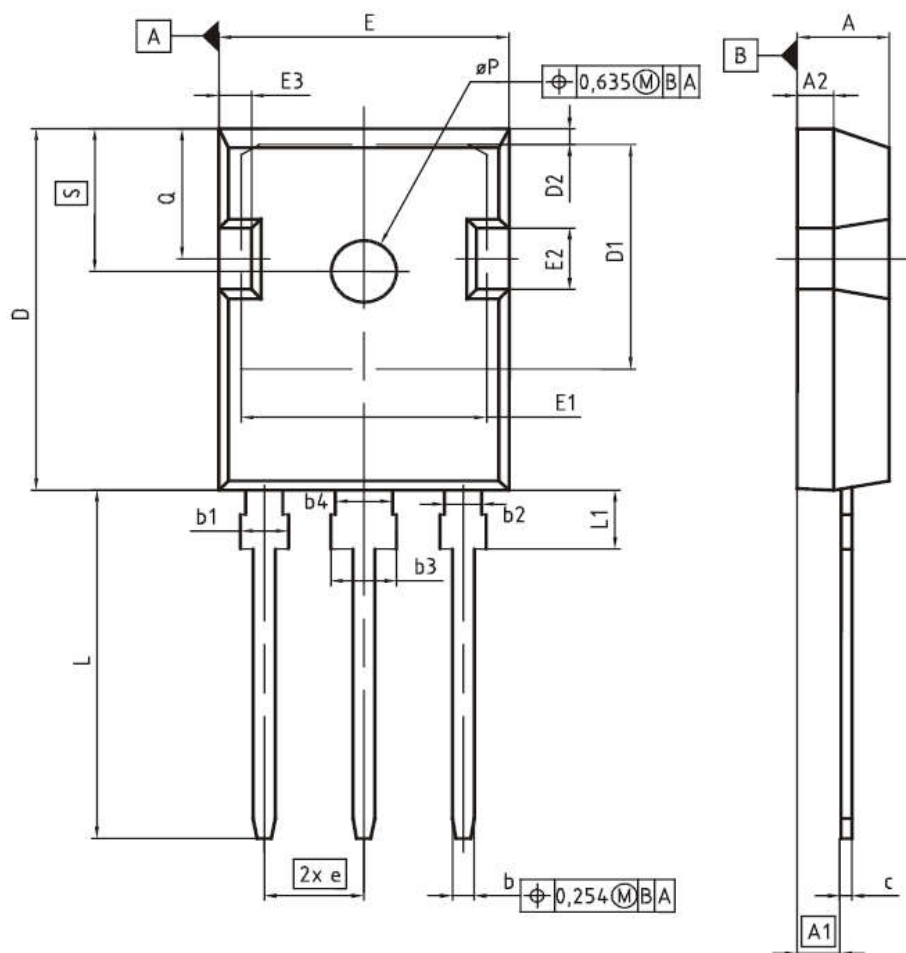


Fig. 10 Capacitance characteristics



PG-TO247-3



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.83 | 5.21 | 0.190 | 0.205 |
| A1 | 2.27 | 2.54 | 0.089 | 0.100 |
| A2 | 1.85 | 2.16 | 0.073 | 0.085 |
| b | 1.07 | 1.33 | 0.042 | 0.052 |
| b1 | 1.90 | 2.41 | 0.075 | 0.095 |
| b2 | 1.90 | 2.16 | 0.075 | 0.085 |
| b3 | 2.87 | 3.38 | 0.113 | 0.133 |
| b4 | 2.87 | 3.13 | 0.113 | 0.123 |
| c | 0.55 | 0.68 | 0.022 | 0.027 |
| D | 20.80 | 21.10 | 0.819 | 0.831 |
| D1 | 16.25 | 17.65 | 0.640 | 0.695 |
| D2 | 0.95 | 1.35 | 0.037 | 0.053 |
| E | 15.70 | 16.13 | 0.618 | 0.635 |
| E1 | 13.10 | 14.15 | 0.516 | 0.557 |
| E2 | 3.68 | 5.10 | 0.145 | 0.201 |
| E3 | 1.00 | 2.60 | 0.039 | 0.102 |
| e | 5.44 (BSC) | | 0.214 (BSC) | |
| N | 3 | | 3 | |
| L | 19.80 | 20.32 | 0.780 | 0.800 |
| L1 | 4.10 | 4.47 | 0.161 | 0.176 |
| øP | 3.50 | 3.70 | 0.138 | 0.146 |
| Q | 5.49 | 6.00 | 0.216 | 0.236 |
| S | 6.04 | 6.30 | 0.238 | 0.248 |