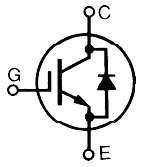
# IXYS

## High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

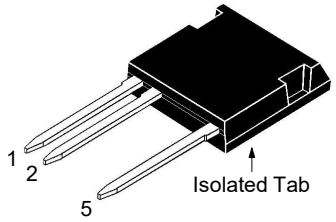
# IXBF14N300

$V_{CES}$ = 3000V
$I_{C90}$ = 14A
$V_{CE(sat)} \leq$ 2.7V




**(Electrically Isolated Tab)**

**ISOPLUS i4-Pak™**




1 = Gate 5 = Collector
2 = Emitter

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 3000 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 3000 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 28 | A |
| $I_{C90}$ | $T_C$ = 90°C | 14 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 98 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 20Ω<br>Clamped Inductive Load | $I_{CM}$ = 120<br>$V_{CE} \leq$ 1500 | A<br>V |
| $t_{SC}$ **(SCSOA)** | $V_{GE}$ = 15V, $T_J$ = 125°C,<br>$R_G$ = 82Ω, $V_{CE}$ = 1500V, Non-Repetitive | 10 | μs |
| $P_C$ | $T_C$ = 25°C | 120 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering<br>1.6 mm (0.062 in.) from Case for 10s | 300 | °C |
| $F_C$ | Mounting Force | 20..120 / 4.5..27 | N/lb. |
| $V_{ISOL}$ | 50/60Hz, 5 Seconds | 4000 | V~ |
| **Weight** | | 5 | g |

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250μA, $V_{GE}$ = 0V | 3000 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 25 | μA |
| | Note 2, $T_J$ = 125°C | | | 1 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = 14A, $V_{GE}$ = 15V, Note 1 | | 2.2 | 2.7 | V |
| | $T_J$ = 125°C | | 2.7 | | V |

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

### Advantages

- Low Gate Drive Requirement
- High Power Density

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C$ = 14A, $V_{CE}$ = 10V, Note 1 | 8 | 13 | | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 1275 | | pF |
| $C_{oes}$ | | | 50 | | pF |
| $C_{res}$ | | | 18 | | pF |
| $Q_g$ | $I_C$ = 14A, $V_{GE}$ = 15V, $V_{CE}$ = 1500V | | 62 | | nC |
| $Q_{ge}$ | | | 7 | | nC |
| $Q_{gc}$ | | | 30 | | nC |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 25°C** | | 40 | | ns |
| $t_r$ | $I_C$ = 14A, $V_{GE}$ = 15V | | 380 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 960V, $R_G$ = 20Ω | | 166 | | ns |
| $t_f$ | | | 1900 | | ns |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 125°C** | | 64 | | ns |
| $t_r$ | $I_C$ = 14A, $V_{GE}$ = 15V | | 746 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 960V, $R_G$ = 20Ω | | 180 | | ns |
| $t_f$ | | | 1730 | | ns |
| $R_{thJC}$ | | | | 1.04 | °C/W |
| $R_{thCS}$ | | | 0.15 | | °C/W |

**Reverse Diode**

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 14A, $V_{GE}$ = 0V, Note 1 | | | 2.7 | V |
| $t_{rr}$ | $I_F$ = 7A, $V_{GE}$ = 0V, $-di_F/dt$ = 100A/μs | | 1.4 | | μs |
| $I_{RM}$ | $V_R$ = 100V, $V_{GE}$ = 0V | | 23 | | A |
| $Q_{RM}$ | | | 16 | | μC |

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

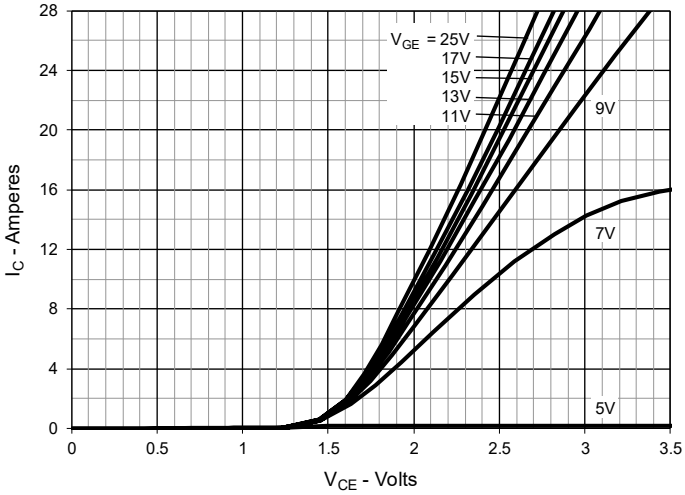



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

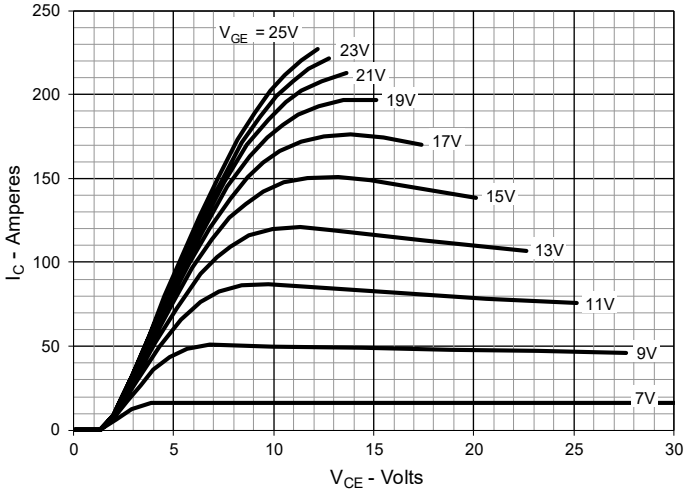



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

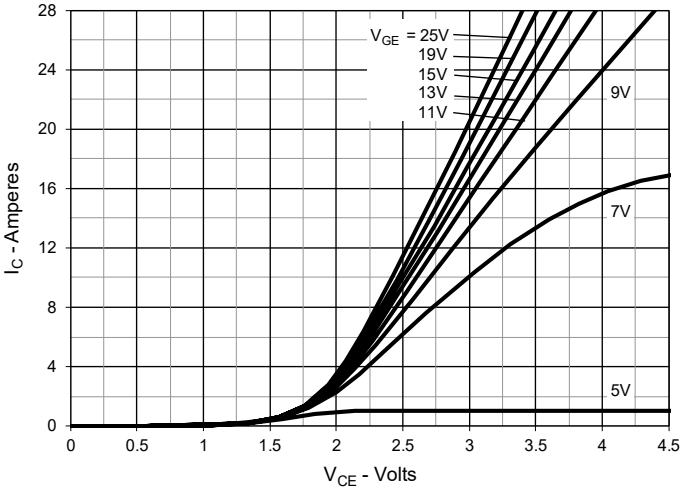



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

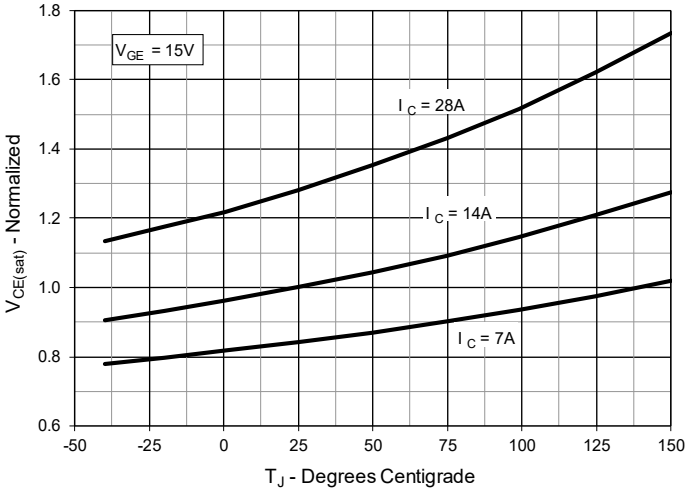



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

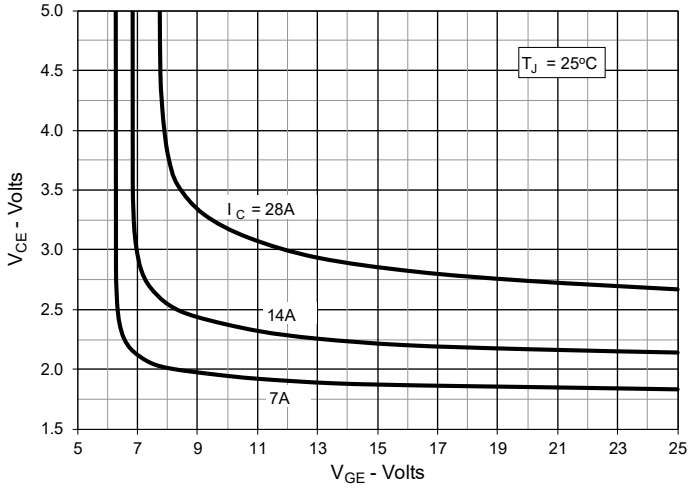



**Fig. 6. Input Admittance**

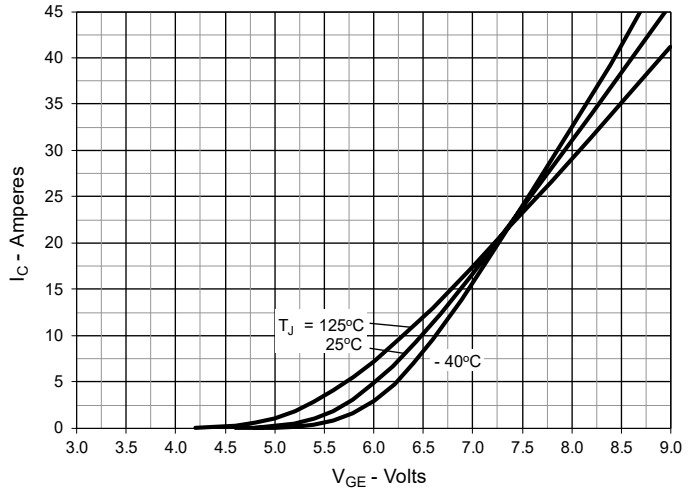


**Fig. 7. Transconductance**

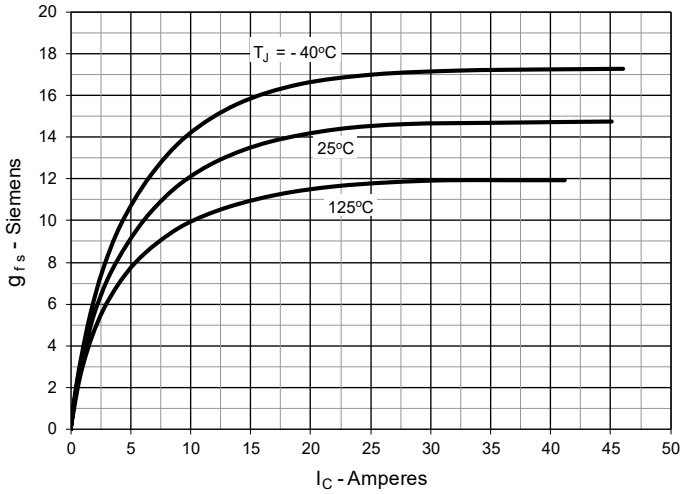



**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

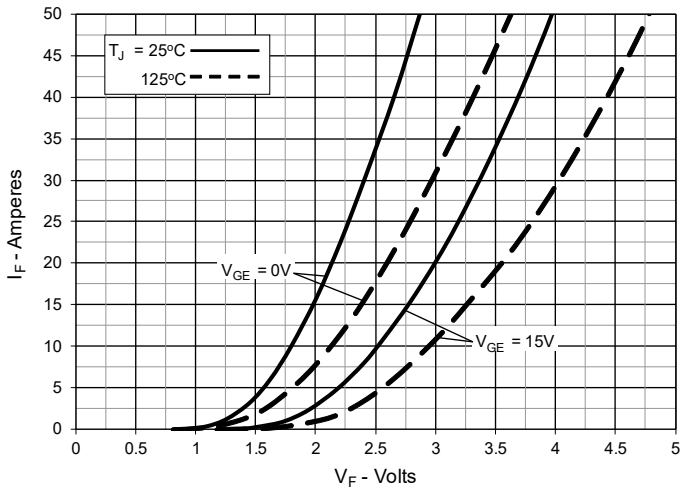



**Fig. 9. Gate Charge**

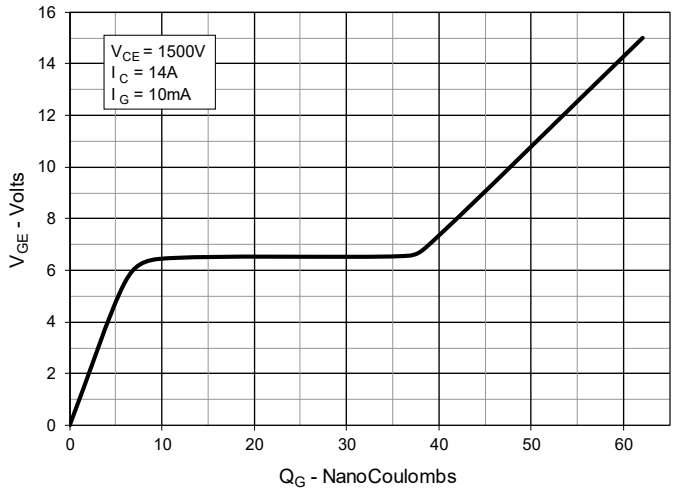



**Fig. 10. Capacitance**

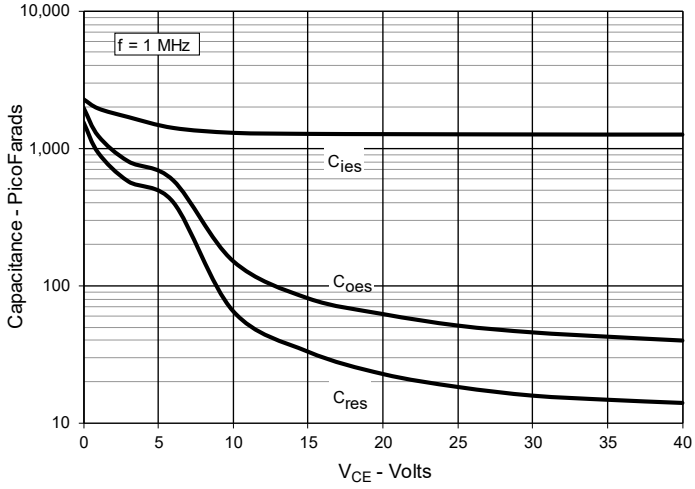



**Fig. 11. Reverse-Bias Safe Operating Area**

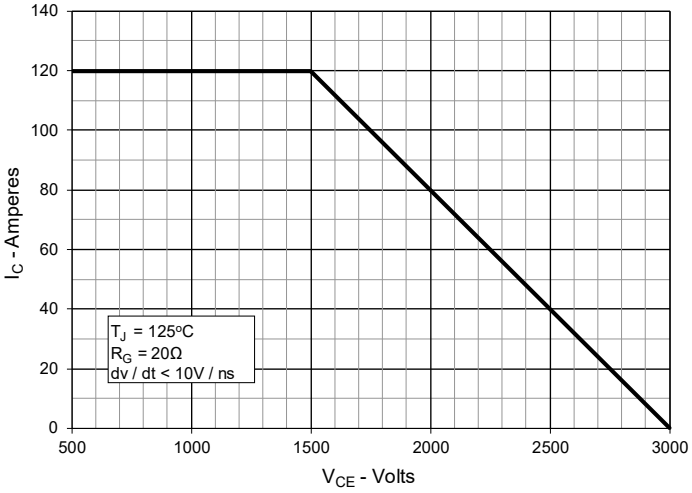



**Fig. 12. Maximum Transient Thermal Impedance**

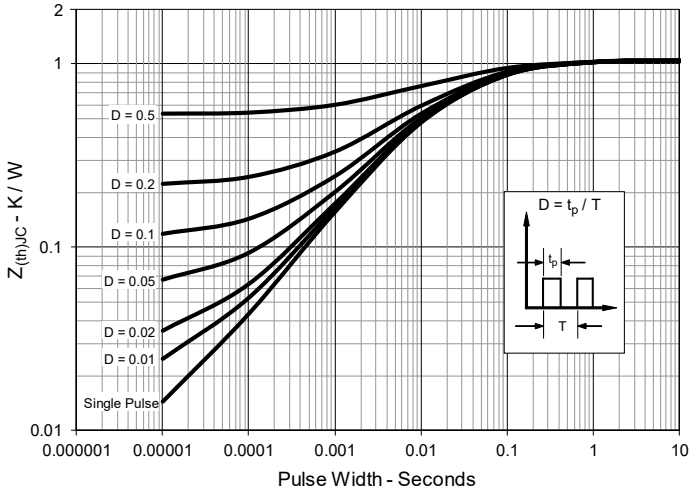


**Fig. 13. Forward-Bias Safe Operating Area @ $T_C$ = 25ºC**

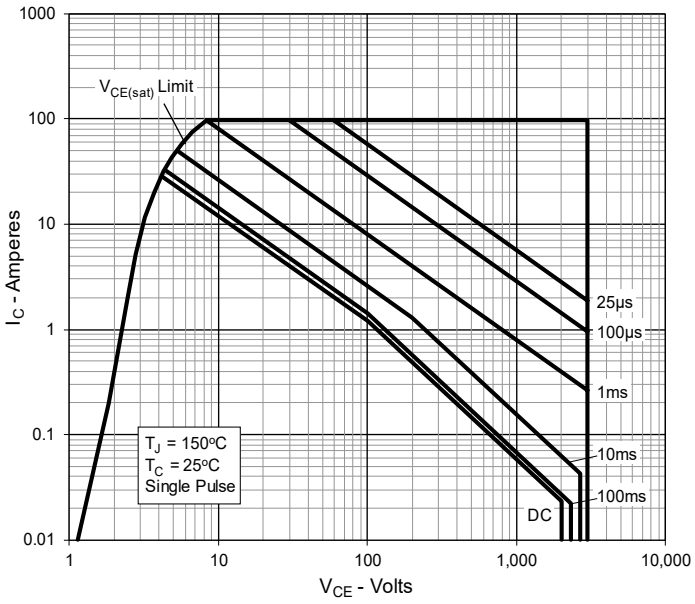
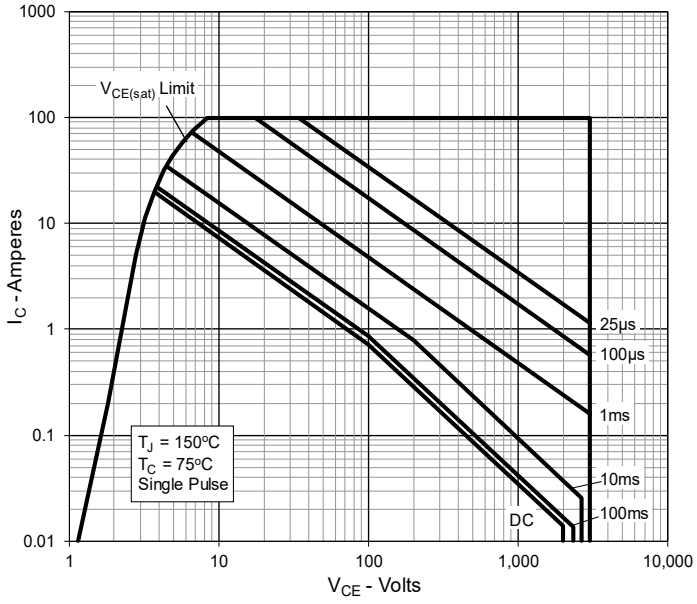
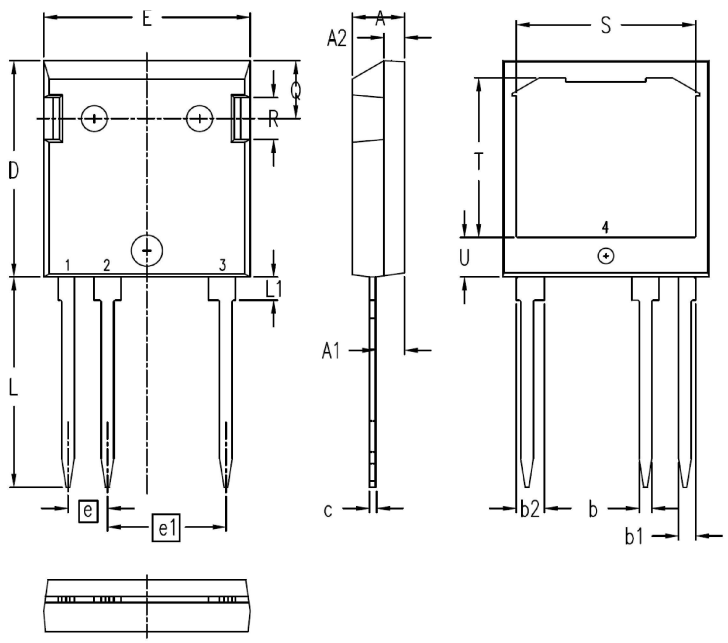



**Fig. 14. Forward-Bias Safe Operating Area @ $T_C$ = 75ºC**



**ISOPLUS i4-Pak Outline**




**1 = Gate**
**2 = Emitter**
**3,4 = Colector**

| SYM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .193 | .201 | 4.90 | 5.10 |
| A1 | .106 | .114 | 2.70 | 2.90 |
| A2 | .075 | .083 | 1.90 | 2.10 |
| b | .047 | .055 | 1.20 | 1.40 |
| b1 | .061 | .069 | 1.55 | 1.75 |
| b2 | .087 | .094 | 2.20 | 2.40 |
| c | .020 | .029 | 0.51 | 0.74 |
| D | .819 | .846 | 20.80 | 21.50 |
| E | .768 | .799 | 19.50 | 20.30 |
| e | .150 BSC | | 3.81 BSC | |
| e1 | .450 BSC | | 11.43 BSC | |
| L | .780 | .838 | 19.80 | 21.30 |
| L1 | .083 | .094 | 2.10 | 2.40 |
| Q | .213 | .236 | 5.40 | 6.00 |
| R | .157 | .169 | 4.00 | 4.30 |
| S | .673 | .685 | 17.10 | 17.40 |
| T | .602 | .614 | 15.30 | 15.60 |
| U | .142 | .154 | 3.60 | 3.90 |

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