# IXFH140N10P-VB Datasheet

## N-Channel 100 V (D-S) 175 °C MOSFET

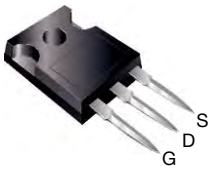
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A) |
| 100 | 0.006 at $V_{GS}$ = 10 V | 150 |

### FEATURES

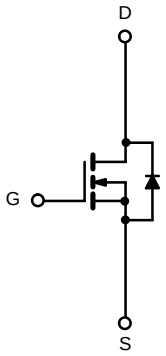
- Trench Power MOSFET
- New Package with Low Thermal Resistance
- 100 % $R_g$ Tested

RoHS COMPLIAN

TO-247AC




Top View




N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS $T_C$ = 25 °C, unless otherwise noted | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Unit** |
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | |
| Continuous Drain Current ($T_J$ = 175 °C) | $T_C$ = 25 °C | $I_D$ | 150 | A |
| | $T_C$ = 125 °C | | 100[a] | |
| Pulsed Drain Current | | $I_{DM}$ | 600 | |
| Avalanche Current | | $I_{AR}$ | 75 | |
| Repetitive Avalanche Energy[b] | L = 0.1 mH | $E_{AR}$ | 280 | mJ |
| Maximum Power Dissipation[b] | $T_C$ = 25 °C | $P_D$ | 375[c] | W |
| | $T_A$ = 25 °C | | 3.75 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | - 55 to 175 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Unit** |
| Junction-to-Ambient | TO-247 | $R_{thJA}$ | 40 | °C/W |
| Junction-to-Case (Drain) | | $R_{thJC}$ | 0.5 | |

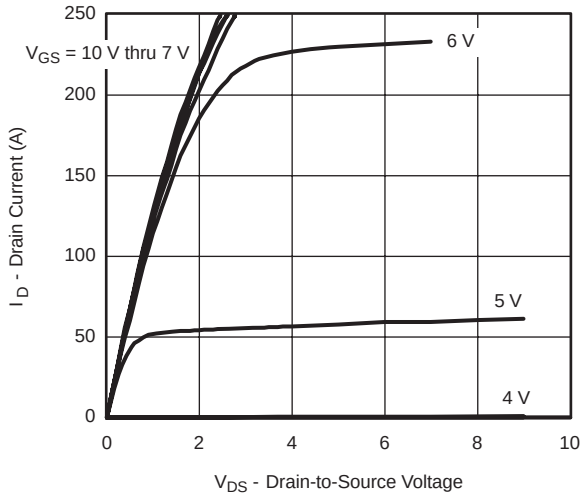
Notes:
a. Package limited.
b. Duty cycle ≤ 1 %.
c. See SOA curve for voltage derating.

| **SPECIFICATIONS** $T_J$ = 25 °C, unless otherwise noted | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{DS}$ = 0 V, $I_D$ = 250 µA | 100 | | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 2 | | 4 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V | | | 1 | µA |
| | | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V, $T_J$ = 125 °C | | | 50 | |
| | | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V, $T_J$ = 175 °C | | | 250 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 120 | | | A |
| Drain-Source On-State Resistance[a] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 30 A | | 0.006 | | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 30 A, $T_J$ = 125 °C | | 0.017 | | |
| | | $V_{GS}$ = 10 V, $I_D$ = 30 A, $T_J$ = 175 °C | | 0.025 | | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 30 A | 25 | | | S |
| **Dynamic[b]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 6700 | | pF |
| Output Capacitance | $C_{oss}$ | | | 750 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 280 | | |
| Total Gate Charge[c] | $Q_g$ | $V_{DS}$ = 50 V, $V_{GS}$ = 10 V, $I_D$ = 85 A | | 110 | 160 | nC |
| Gate-Source Charge[c] | $Q_{gs}$ | | | 24 | | |
| Gate-Drain Charge[c] | $Q_{gd}$ | | | 24 | | |
| Gate Resistance | $R_g$ | | 1.0 | | 6.2 | Ω |
| Turn-On Delay Time[c] | $t_{d(on)}$ | $V_{DD}$ = 50 V, $R_L$ = 0.6 Ω, $I_D$ ≅ 85 A, $V_{GEN}$ = 10 V, $R_g$ = 2.5 Ω | | 20 | 30 | ns |
| Rise Time[c] | $t_r$ | | | 125 | 200 | |
| Turn-Off Delay Time[c] | $t_{d(off)}$ | | | 55 | 85 | |
| Fall Time[c] | $t_f$ | | | 130 | 195 | |
| **Source-Drain Diode Ratings and Characteristics** $T_C$ = 25 °C[b] | | | | | | |
| Continuous Current | $I_S$ | | | | 110 | A |
| Pulsed Current | $I_{SM}$ | | | | 240 | |
| Forward Voltage[a] | $V_{SD}$ | $I_F$ = 85 A, $V_{GS}$ = 0 V | | 1.0 | 1.5 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 50 A, dI/dt = 100 A/µs | | 70 | 140 | ns |
| Peak Reverse Recovery Charge | $I_{RM(REC)}$ | | | 5.5 | 10 | A |
| Reverse Recovery Charge | $Q_{rr}$ | | | 0.19 | 0.35 | µC |

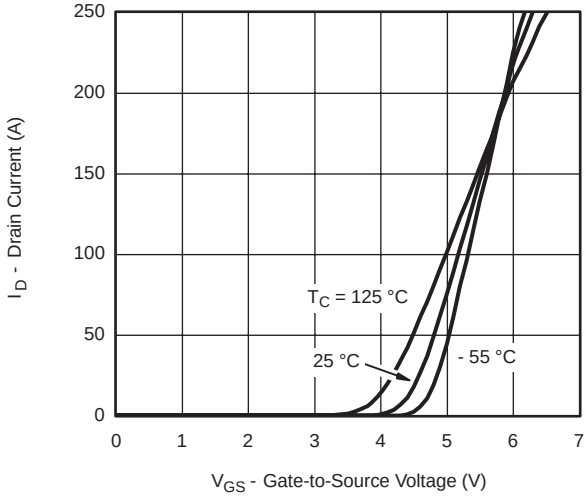
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

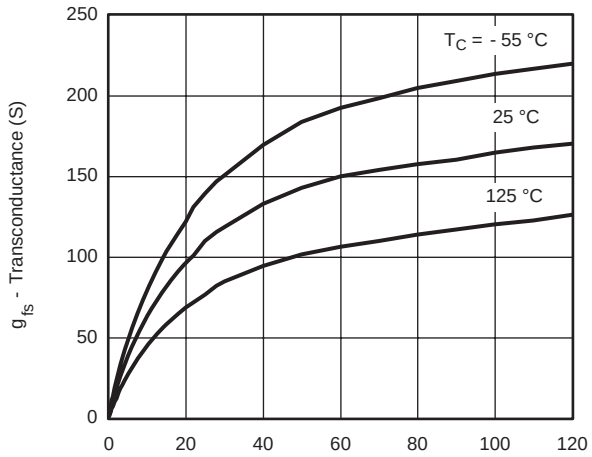
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



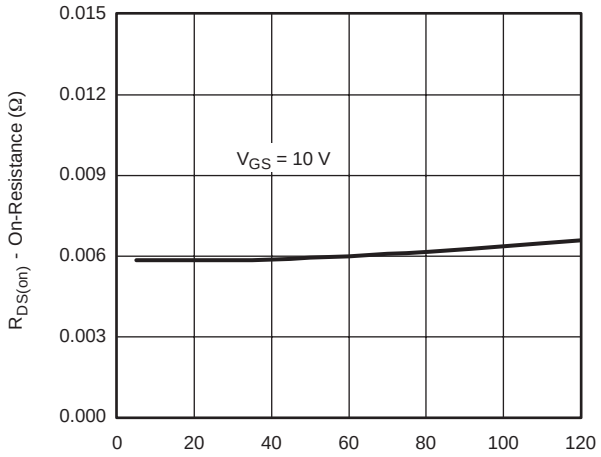

**Output Characteristics**



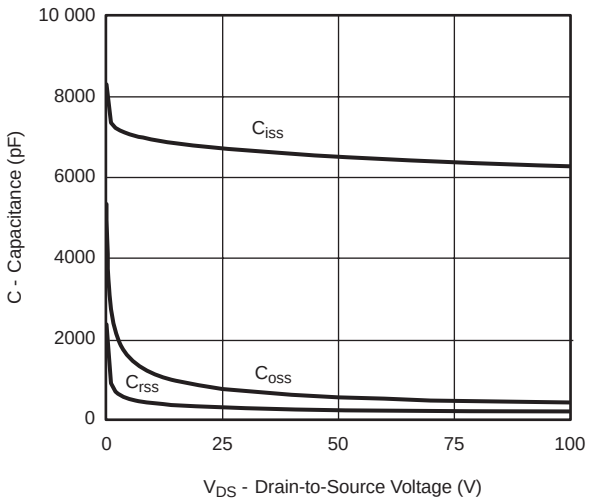

**Transfer Characteristics**



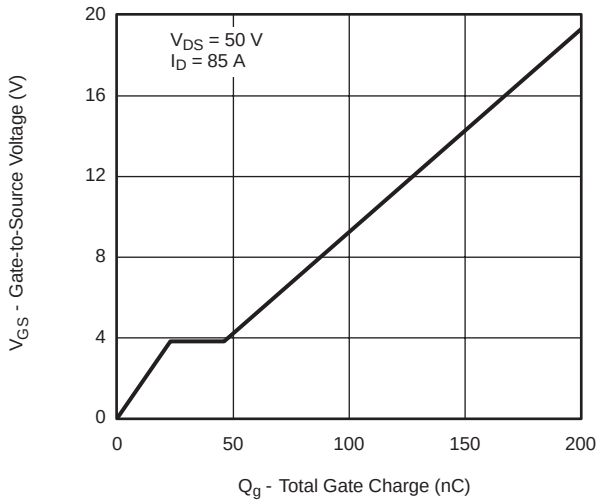

**Transconductance**




**On-Resistance vs. Drain Current**

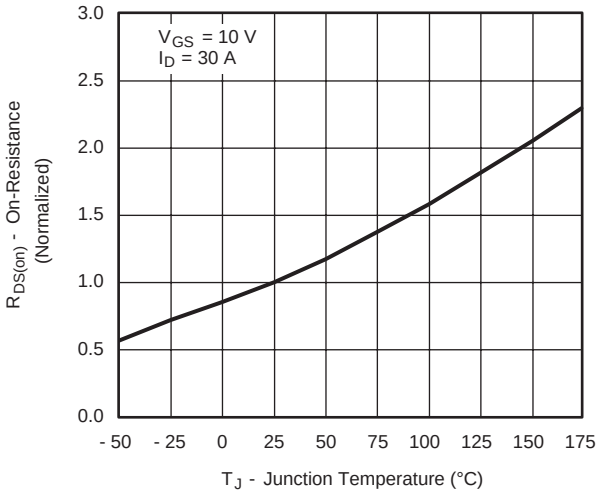



**Capacitance**

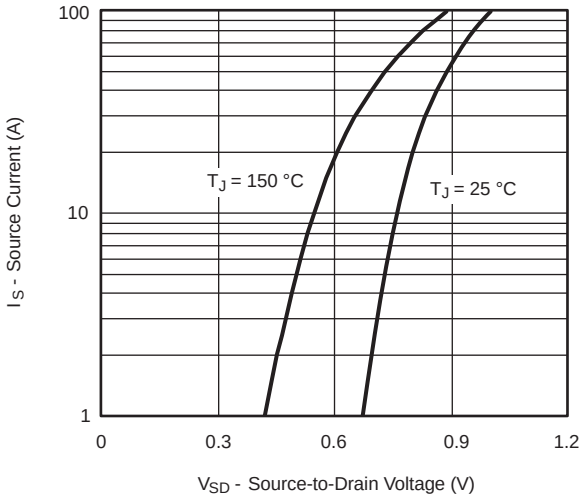



**Gate Charge**

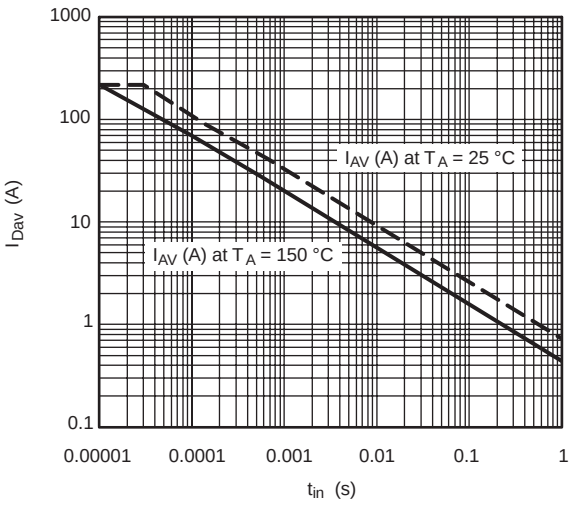
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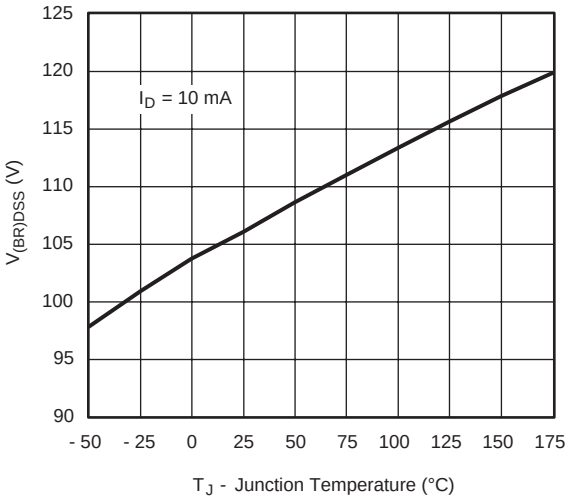

**On-Resistance vs. Junction Temperature**




**Source-Drain Diode Forward Voltage**

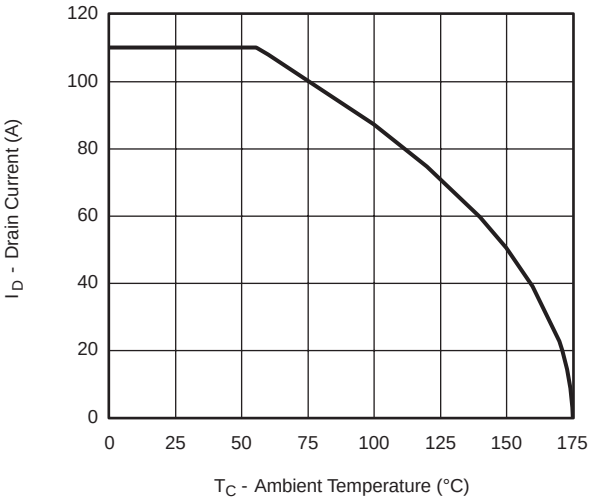



**Avalanche Current vs. Time**

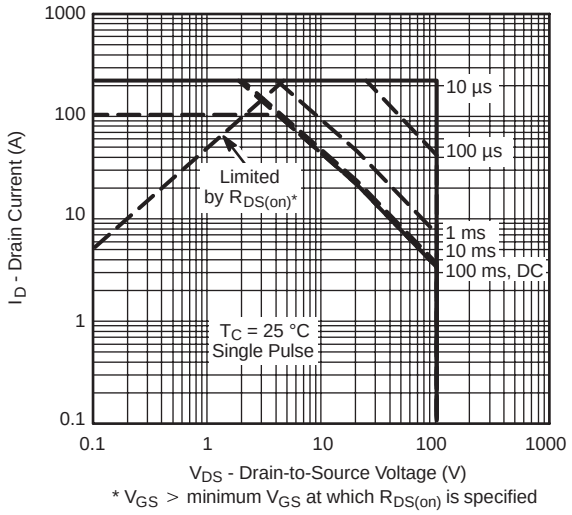



**Drain Source Breakdown vs. Junction Temperature**

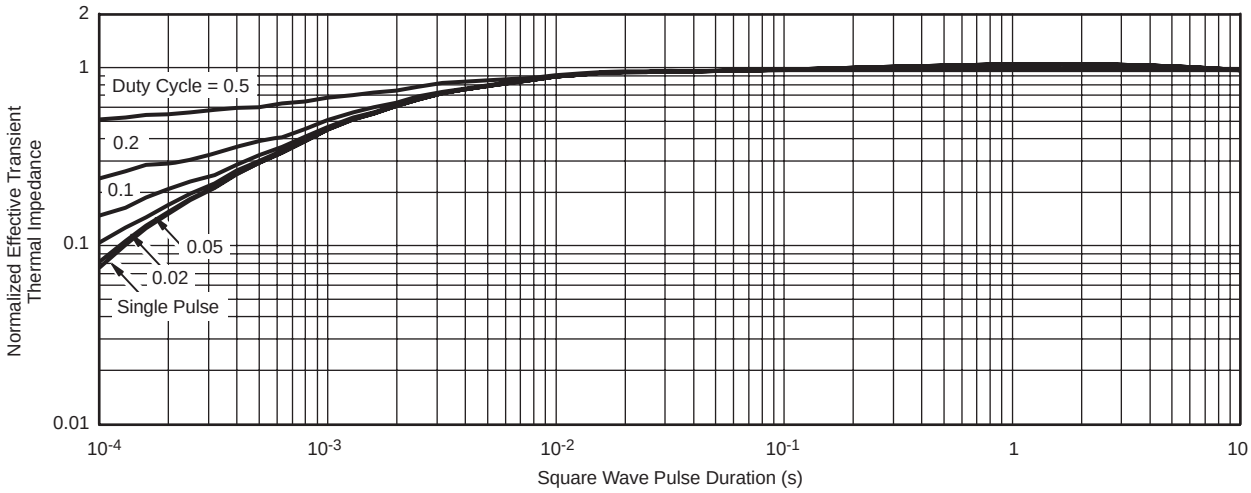
## THERMAL RATINGS




**Maximum Avalanche and Drain Current vs. Case Temperature**

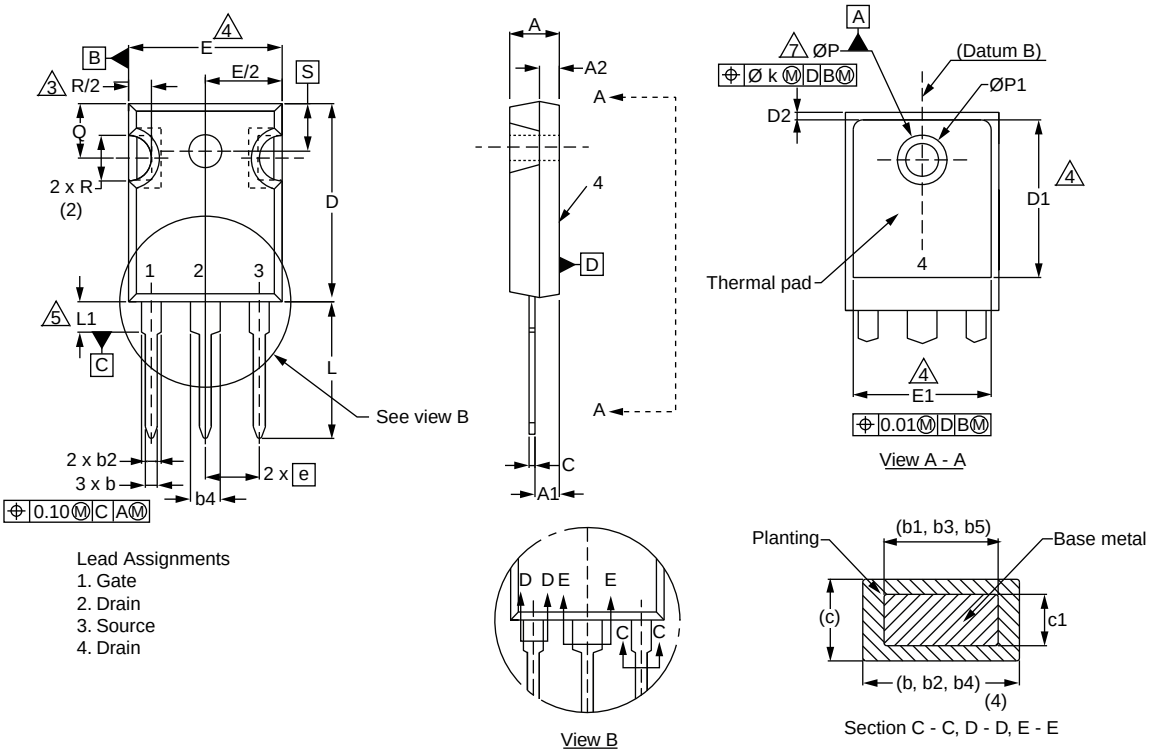



**Safe Operating Area**




**Normalized Thermal Transient Impedance, Junction-to-Case**

# TO-247AC




Lead Assignments
1. Gate
2. Drain
3. Source
4. Drain

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM. | MIN. | MAX. | MIN. | MAX. |
| A | 4.58 | 5.31 | 0.180 | 0.209 |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 |
| A2 | 1.17 | 2.49 | 0.046 | 0.098 |
| b | 0.99 | 1.40 | 0.039 | 0.055 |
| b1 | 0.99 | 1.35 | 0.039 | 0.053 |
| b2 | 1.53 | 2.39 | 0.060 | 0.094 |
| b3 | 1.65 | 2.37 | 0.065 | 0.093 |
| b4 | 2.42 | 3.43 | 0.095 | 0.135 |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 |
| c | 0.38 | 0.86 | 0.015 | 0.034 |
| c1 | 0.38 | 0.76 | 0.015 | 0.030 |
| D | 19.71 | 20.82 | 0.776 | 0.820 |
| D1 | 13.08 | - | 0.515 | - |

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM. | MIN. | MAX. | MIN. | MAX. |
| D2 | 0.51 | 1.30 | 0.020 | 0.051 |
| E | 15.29 | 15.87 | 0.602 | 0.625 |
| E1 | 13.72 | - | 0.540 | - |
| e | 5.46 BSC | | 0.215 BSC | |
| Ø k | 0.254 | | 0.010 | |
| L | 14.20 | 16.25 | 0.559 | 0.640 |
| L1 | 3.71 | 4.29 | 0.146 | 0.169 |
| N | 7.62 BSC | | 0.300 BSC | |
| Ø P | 3.51 | 3.66 | 0.138 | 0.144 |
| Ø P1 | - | 7.39 | - | 0.291 |
| Q | 5.31 | 5.69 | 0.209 | 0.224 |
| R | 4.52 | 5.49 | 0.178 | 0.216 |
| S | 5.51 BSC | | 0.217 BSC | |

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