

Product Summary

| | | |
|-------------------------|-------------------------------|--|
| BV_{DSS} | R_{DS(ON)} Max | I_D T_C = +25°C |
| 40V | 4.7mΩ @ V _{GS} = 10V | 100A |

Description and Applications

This new generation MOSFET features low on-resistance and fast switching, making it ideal for high efficiency power management applications.

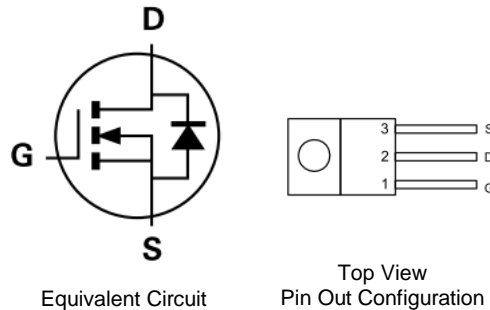
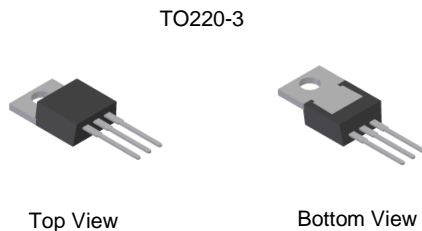
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low Input Capacitance
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: TO220-3
- Case Material: Molded Plastic, “Green” Molding Compound, UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ^(e3)
- Terminal Connections: See Diagram Below
- Weight: 1.85 grams (Approximate)

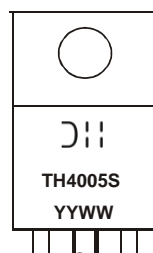


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|---------|----------------|
| DMTH4005SCT | TO220-3 | 50 Pieces/Tube |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



= Manufacturer's Marking
 TH4005S = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 16 = 2016)
 WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|------------------|-------------------------|------|
| Drain-Source Voltage | V _{DSS} | 40 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) | I _D | T _C = +25°C | 100 |
| | | T _C = +100°C | 78 |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | 100 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | I _{DM} | 160 | A |
| Avalanche Current, L=0.1mH | I _{AS} | 32.5 | A |
| Avalanche Energy, L=0.1mH | E _{AS} | 52.8 | mJ |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | P _D | 2.8 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 52.8 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 125 | W |
| Thermal Resistance, Junction to Case (Note 6) | R _{θJC} | 1.2 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|-----|------|------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 40 | — | — | V | V _{GS} = 0V, I _D = 1mA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | µA | V _{DS} = 32V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 2 | — | 4 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 3.8 | 4.7 | mΩ | V _{GS} = 10V, I _D = 50A |
| Diode Forward Voltage | V _{SD} | — | — | 1.2 | V | V _{GS} = 0V, I _S = 50A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{ISS} | — | 3062 | — | pF | V _{DS} = 20V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{OSS} | — | 902 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 179 | — | | |
| Gate Resistance | R _G | — | 0.67 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 49.1 | — | nC | V _{DD} = 20V, I _D = 50A, V _{GS} = 10V |
| Gate-Source Charge | Q _{gs} | — | 10.3 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 13 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 8.7 | — | ns | V _{DD} = 20V, V _{GS} = 10V, I _D = 50A, R _G = 3Ω |
| Turn-On Rise Time | t _r | — | 6.8 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 18.6 | — | | |
| Turn-Off Fall Time | t _f | — | 7.3 | — | | |
| Reverse Recovery Time | t _{RR} | — | 31.8 | — | ns | I _F = 50A, di/dt = 100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 26.5 | — | nC | |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on infinite heat sink.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

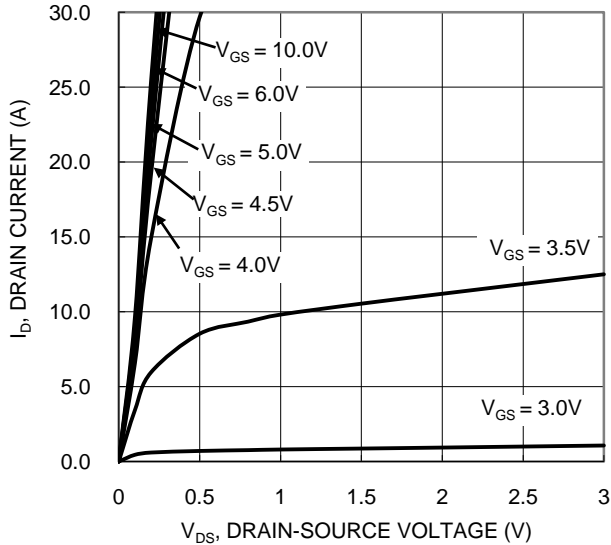


Figure 1. Typical Output Characteristic

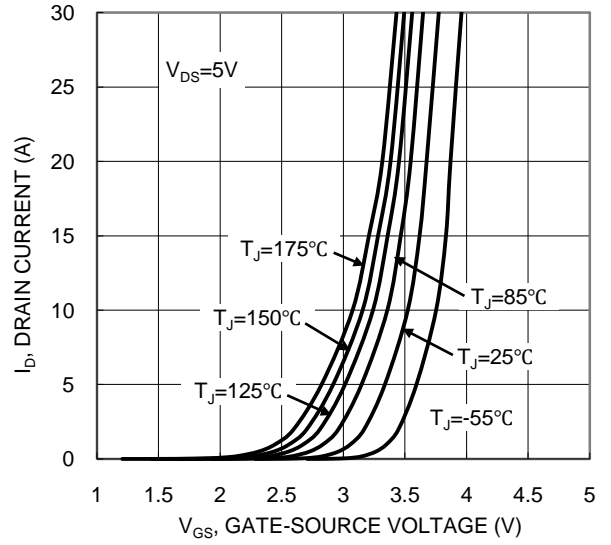


Figure 2. Typical Transfer Characteristic

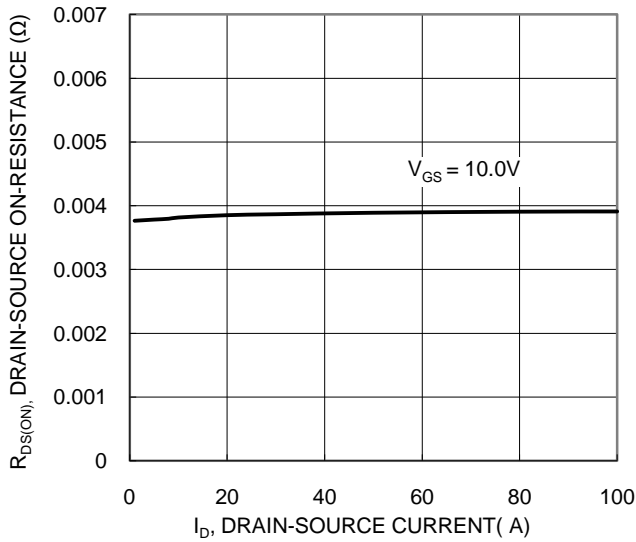


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

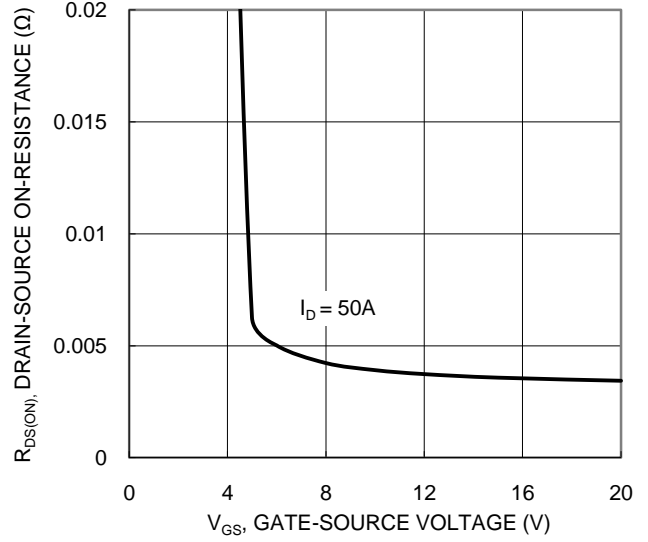


Figure 4. Typical Transfer Characteristic

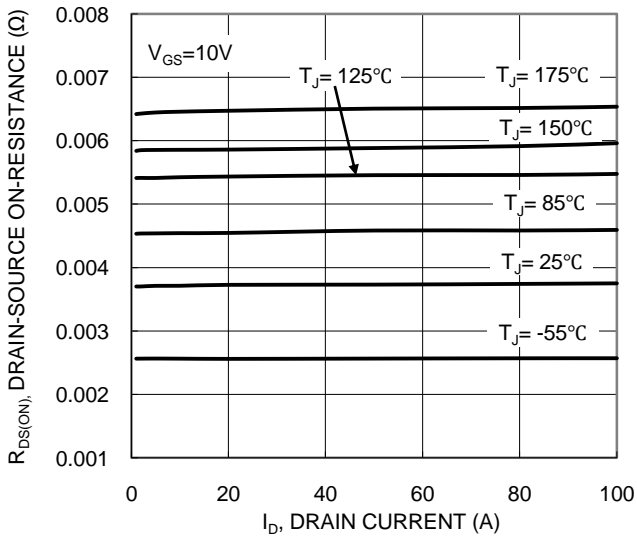


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

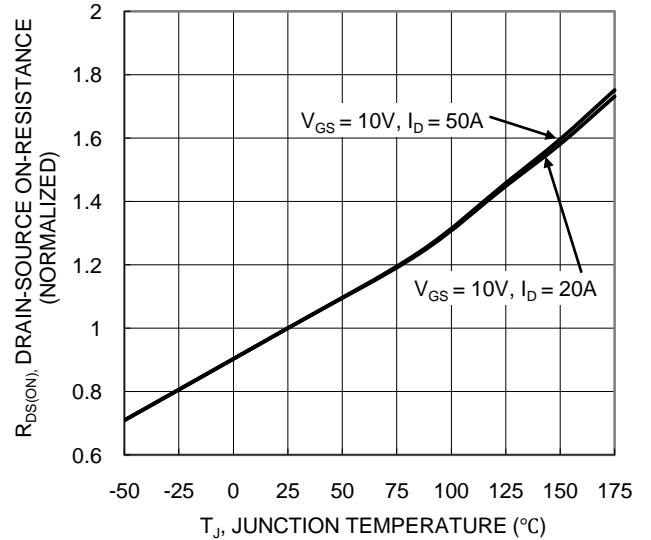


Figure 6. On-Resistance Variation with Temperature

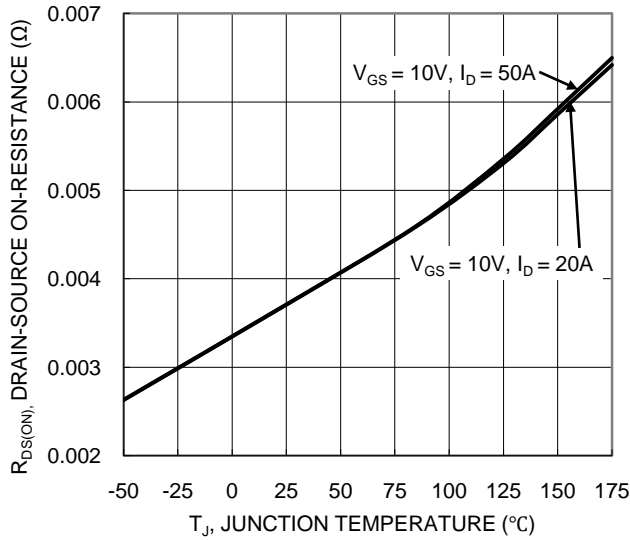


Figure 7. On-Resistance Variation with Temperature

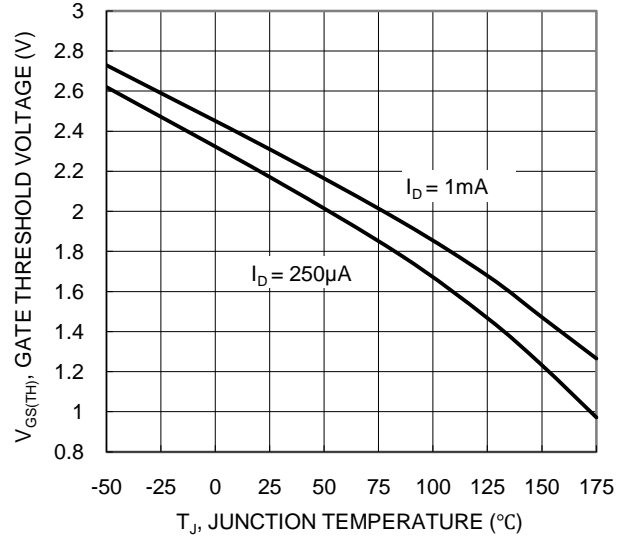


Figure 8. Gate Threshold Variation vs. Temperature

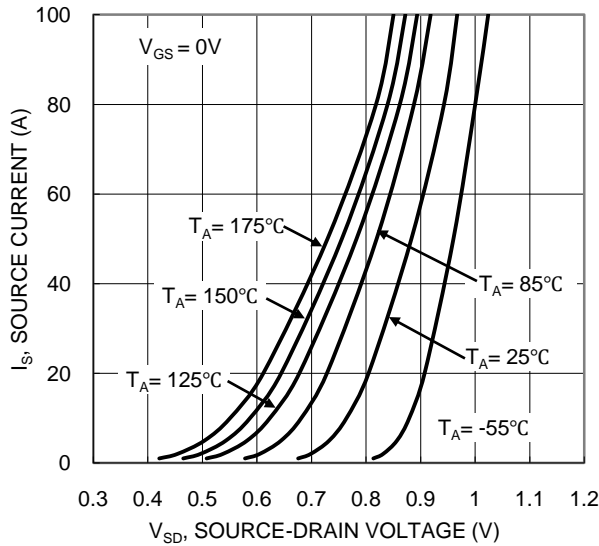


Figure 9. Diode Forward Voltage vs. Current

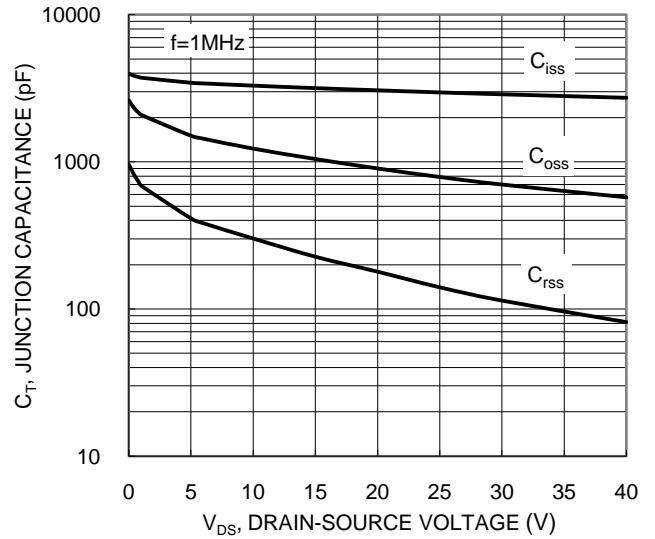


Figure 10. Typical Junction Capacitance

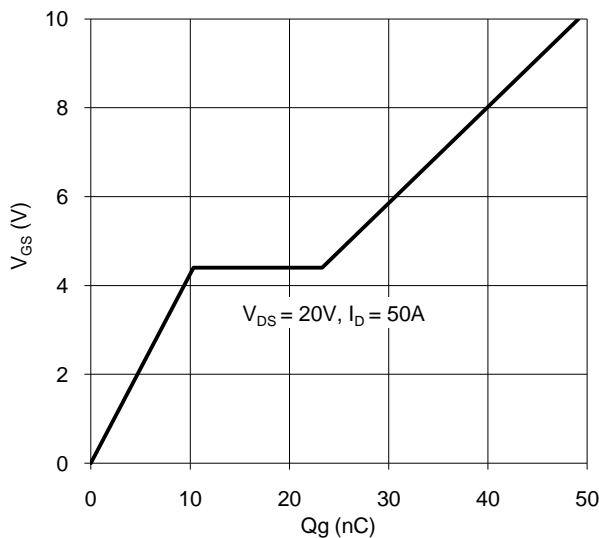


Figure 11. Gate Charge

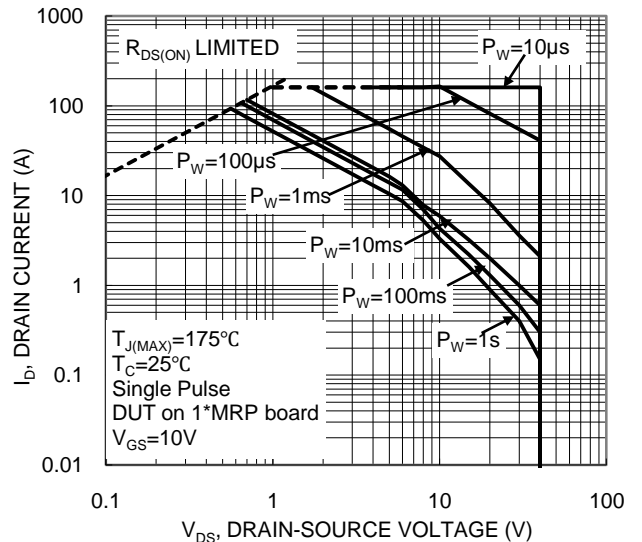
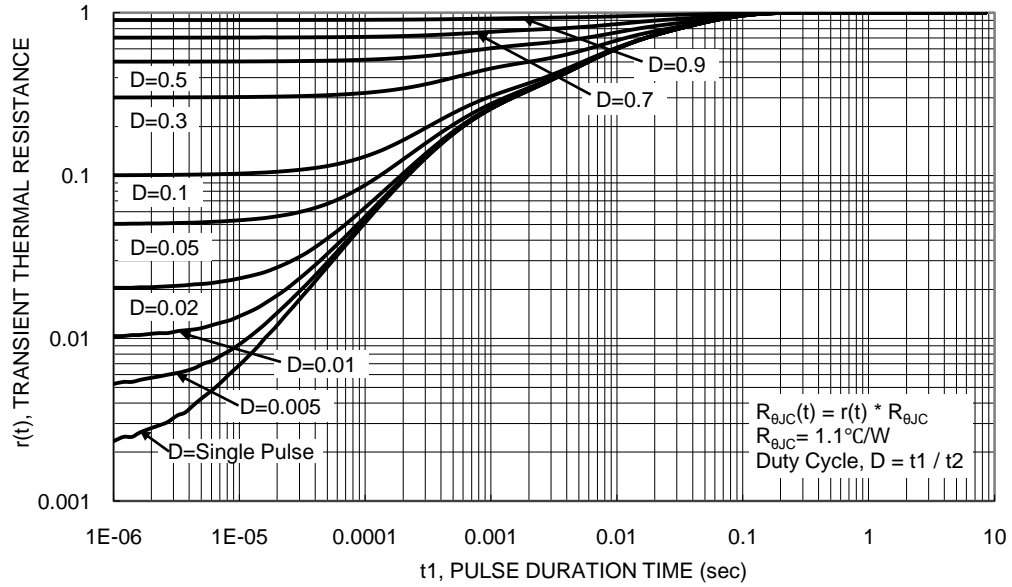
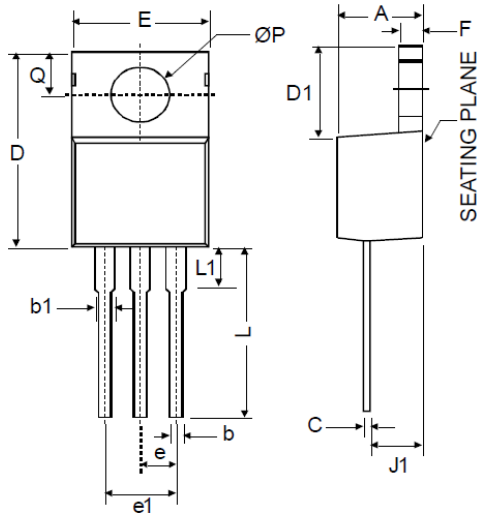


Figure 12. SOA, Safe Operation Area



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| TO220-3 | | |
|-----------------------------|-------|-------|
| Dim | Min | Max |
| A | 3.55 | 4.85 |
| b | 0.51 | 1.14 |
| b1 | 1.14 | 1.78 |
| C | 0.31 | 1.14 |
| D | 14.20 | 16.50 |
| D1 | 5.84 | 6.86 |
| E | 9.70 | 10.70 |
| e | 2.79 | 2.99 |
| e1 | 4.83 | 5.33 |
| F | 0.51 | 1.40 |
| J1 | 2.03 | 2.92 |
| L | 12.72 | 14.72 |
| L1 | 3.66 | 6.35 |
| P | 3.53 | 4.09 |
| Q | 2.54 | 3.43 |
| All Dimensions in mm | | |

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