

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ $T_C = +25^\circ\text{C}$
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.

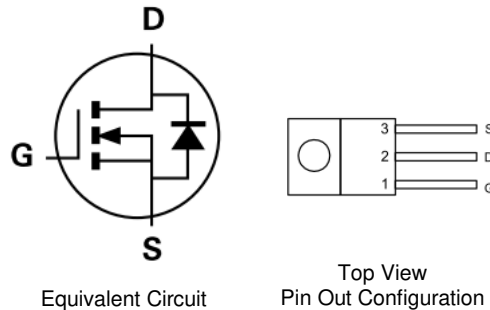
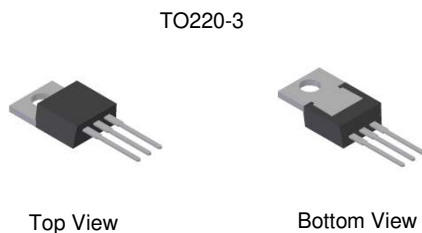
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

## 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 <sup>(E3)</sup>
- Terminal Connections: See Diagram Below
- Weight: 1.85 grams (Approximate)

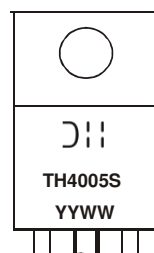


## Ordering Information (Note 4)

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](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<sub>A</sub> = +25°C, unless otherwise specified.)

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

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	2.8	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	52.8	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	125	W
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	1.2	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

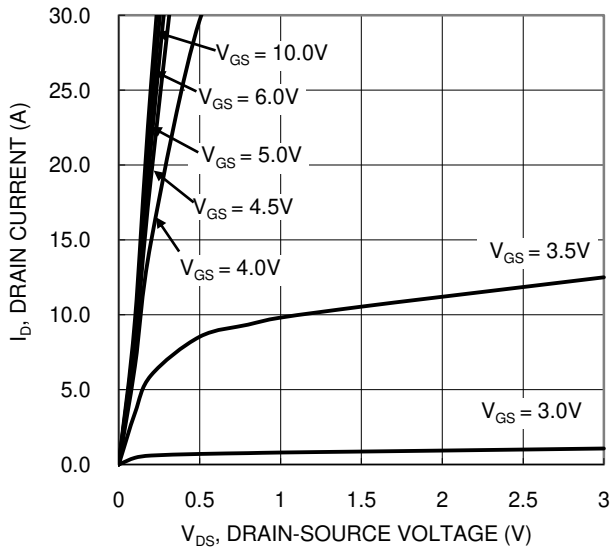


Figure 1. Typical Output Characteristic

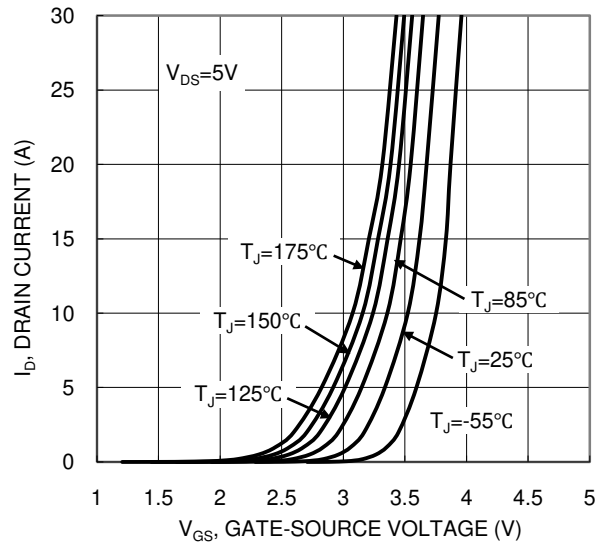


Figure 2. Typical Transfer Characteristic

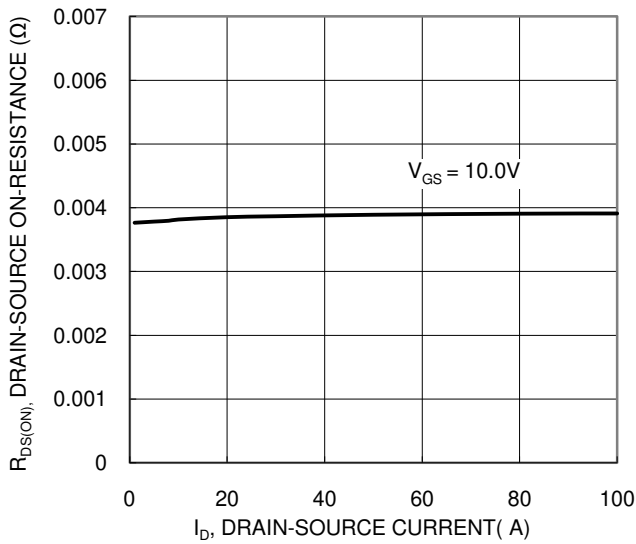


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

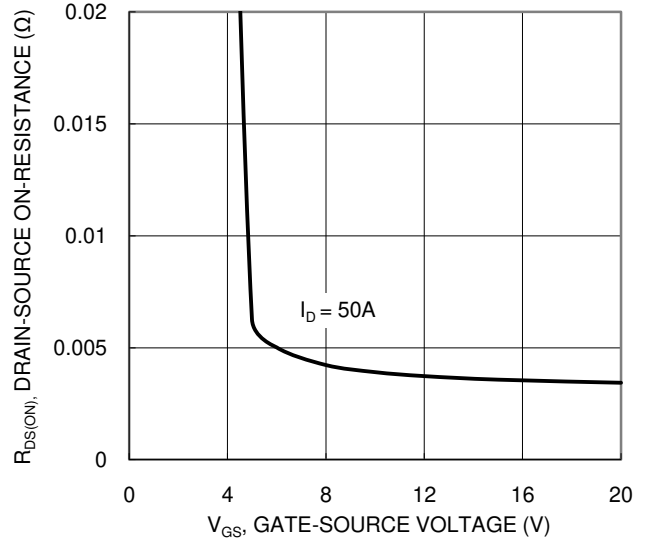


Figure 4. Typical Transfer Characteristic

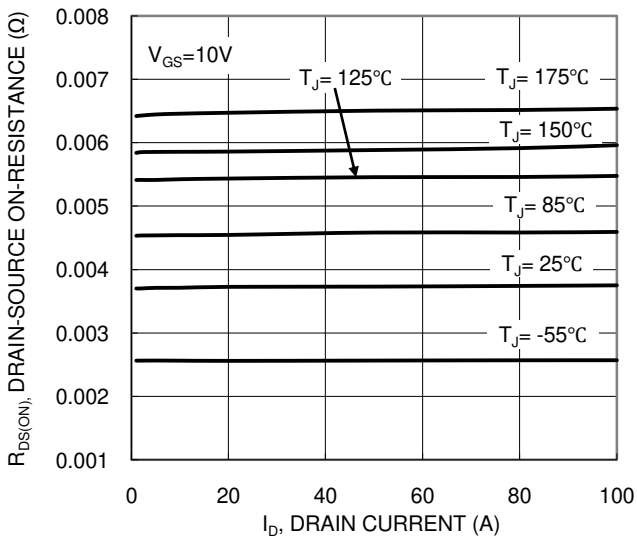


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

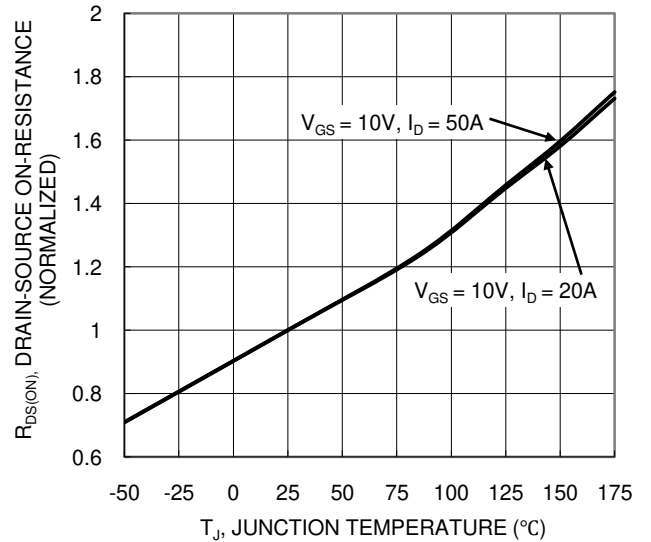
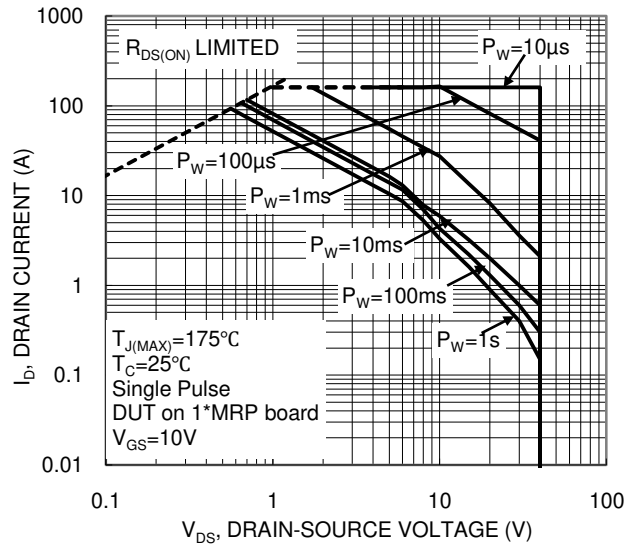
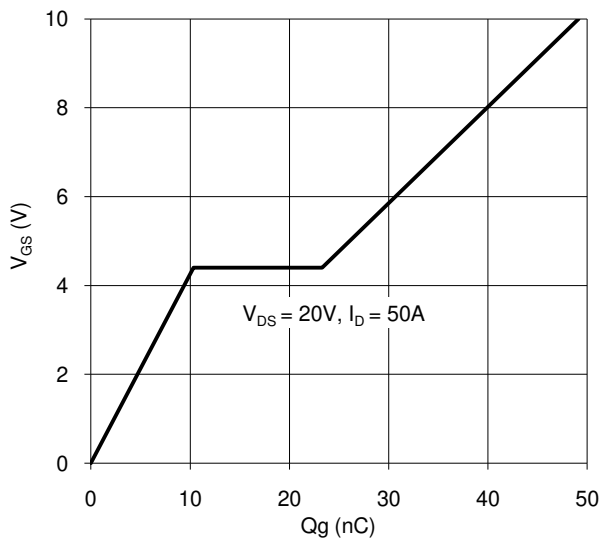
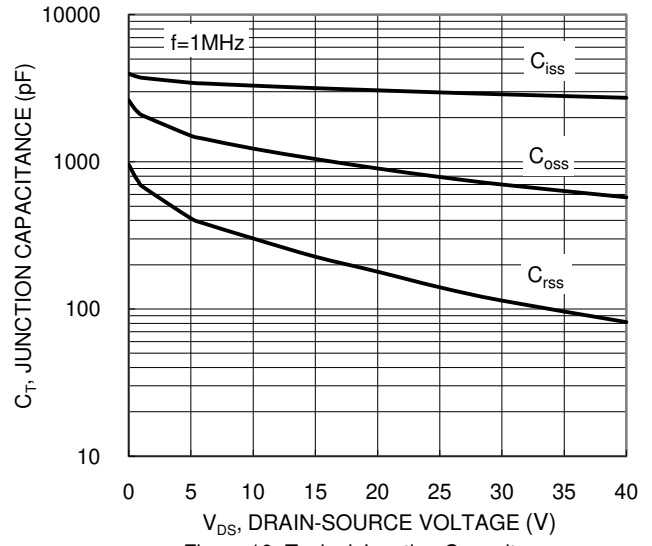
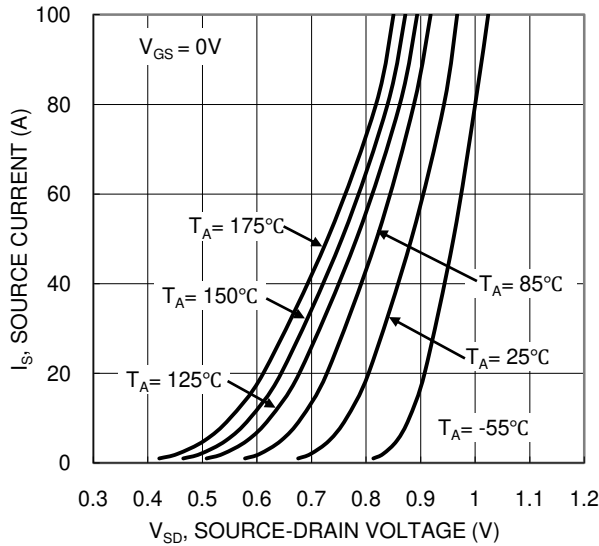
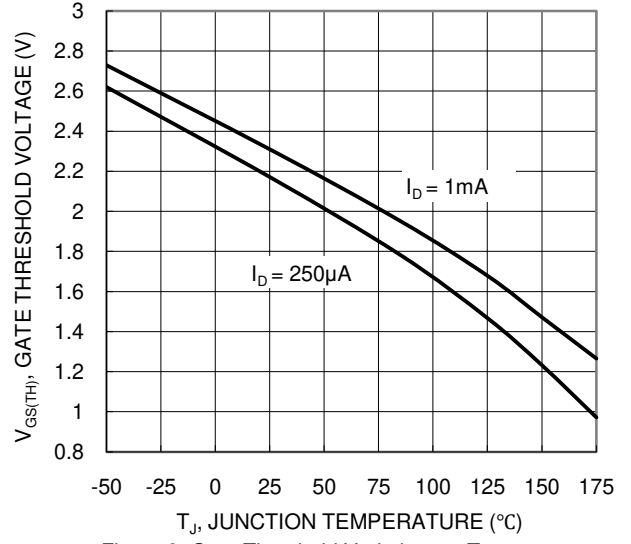
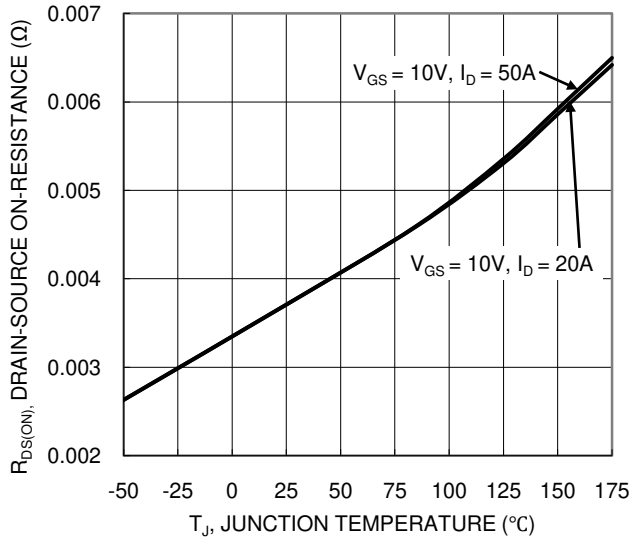
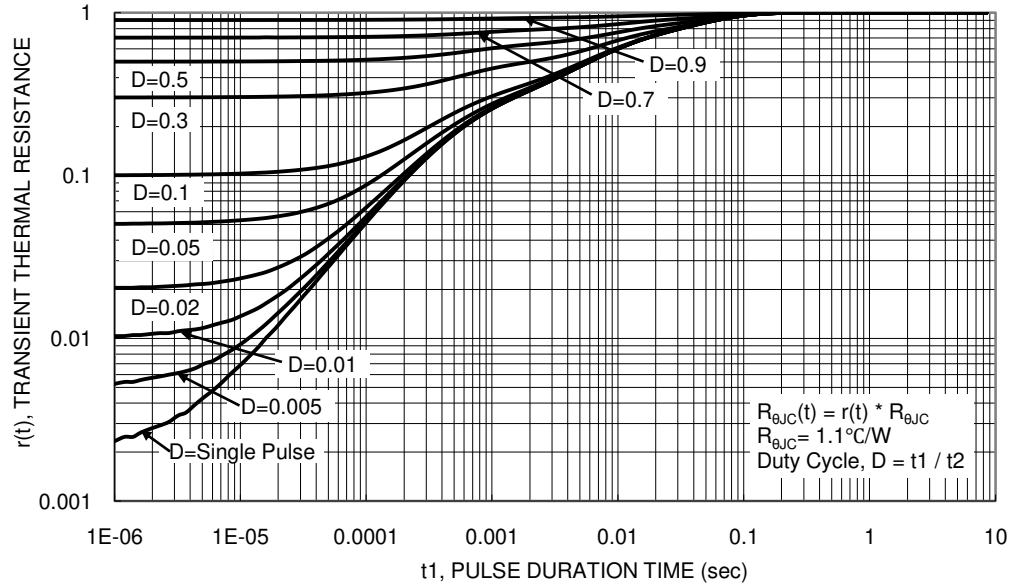


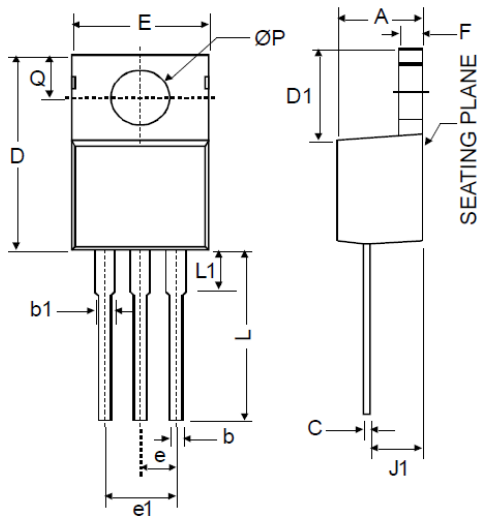
Figure 6. On-Resistance Variation with Temperature





### 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
<b>All Dimensions in mm</b>		

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