

Product Summary

BV _{DSS}	R _{DSON} 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.

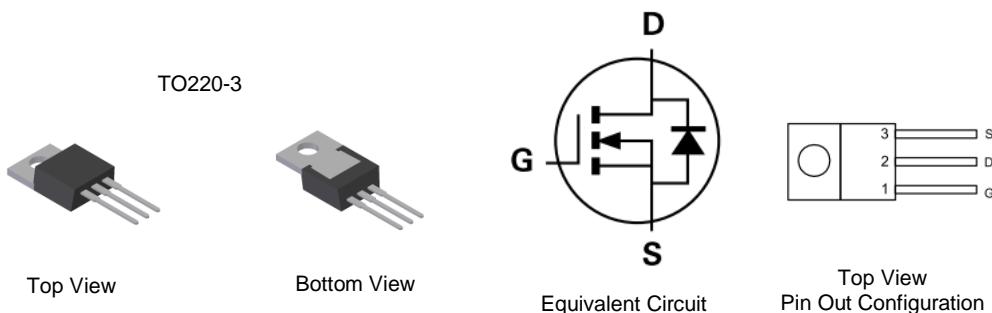
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

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)



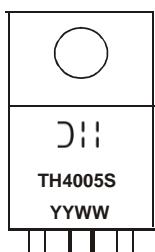
Ordering Information (Note 4)

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 (@ $T_A = +25^\circ\text{C}$, 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)	$T_C = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$	I_D	100 78	A
Maximum Continuous Body Diode Forward Current (Note 6)	$T_C = +25^\circ\text{C}$	I_S	100	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)		I_{DM}	160	A
Avalanche Current, $L=0.1\text{mH}$		I_{AS}	32.5	A
Avalanche Energy, $L=0.1\text{mH}$		E_{AS}	52.8	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	2.8	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	52.8	°C/W
Total Power Dissipation (Note 6)	$T_C = +25^\circ\text{C}$	P_D	125	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.2	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.8	4.7	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 50\text{A}$
Diode Forward Voltage	V_{SD}	—	—	1.2	V	$V_{GS} = 0\text{V}, I_S = 50\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	3062	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	902	—		
Reverse Transfer Capacitance	C_{rss}	—	179	—		
Gate Resistance	R_G	—	0.67	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	49.1	—		
Gate-Source Charge	Q_{gs}	—	10.3	—		
Gate-Drain Charge	Q_{gd}	—	13	—	nC	$V_{DD} = 20\text{V}, I_D = 50\text{A}, V_{GS} = 10\text{V}$
Turn-On Delay Time	$t_{D(ON)}$	—	8.7	—		
Turn-On Rise Time	t_R	—	6.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	18.6	—	ns	$V_{DD} = 20\text{V}, V_{GS} = 10\text{V}, I_D = 50\text{A}, R_G = 3\Omega$
Turn-Off Fall Time	t_F	—	7.3	—		
Reverse Recovery Time	t_{RR}	—	31.8	—		
Reverse Recovery Charge	Q_{RR}	—	26.5	—	nC	$I_F = 50\text{A}, di/dt = 100\text{A}/\mu\text{s}$

Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

6. Device mounted on infinite heat sink.

7. Short duration pulse test used to minimize self-heating effect.

8. Guaranteed by design. Not subject to product testing.

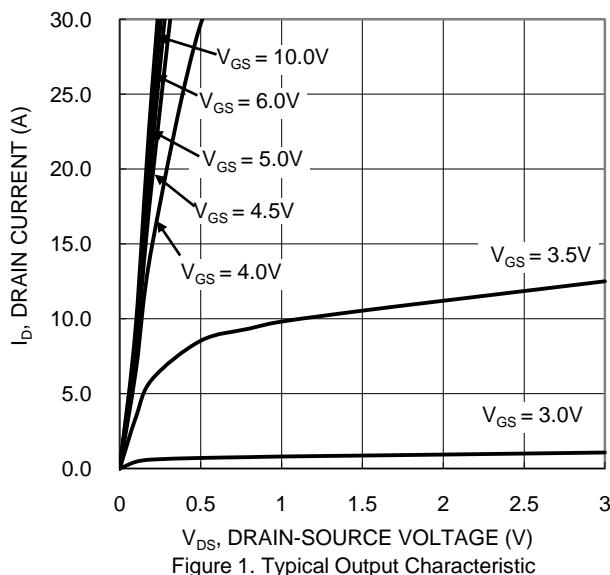


Figure 1. Typical Output Characteristic

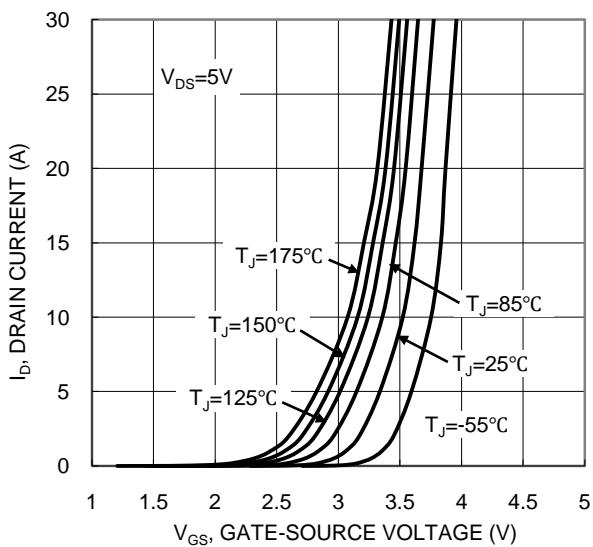


Figure 2. Typical Transfer Characteristic

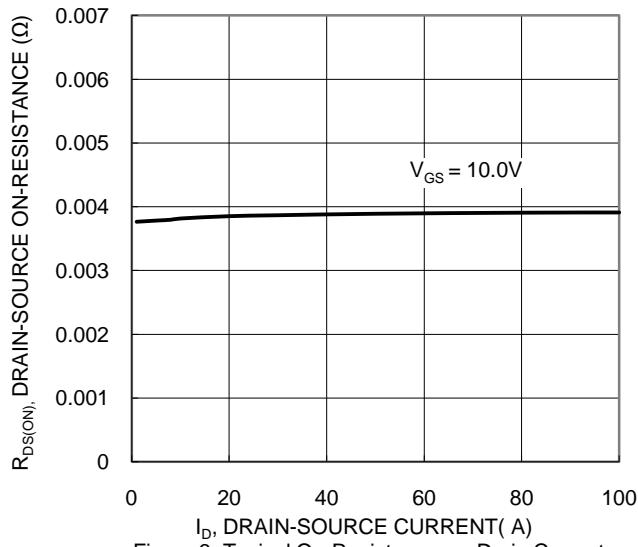


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

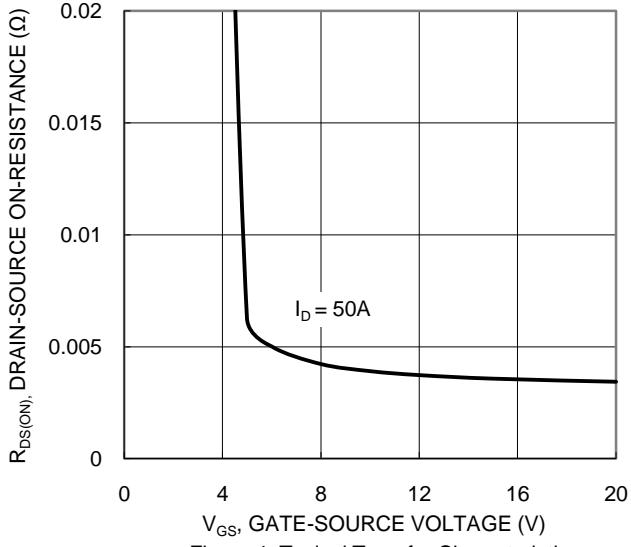


Figure 4. Typical Transfer Characteristic

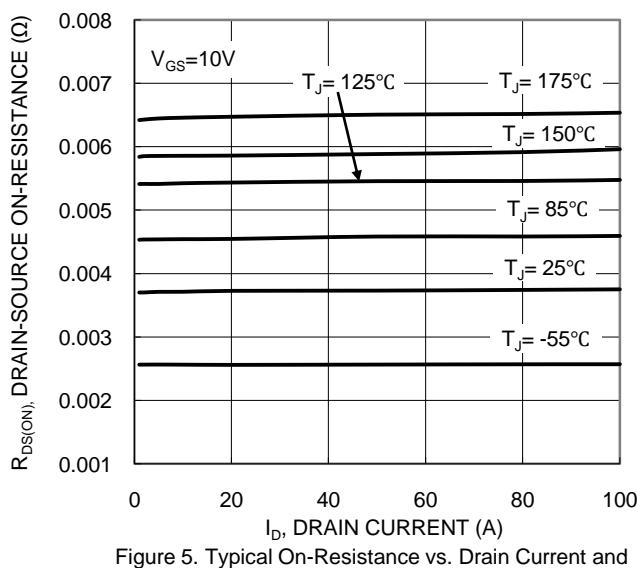


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

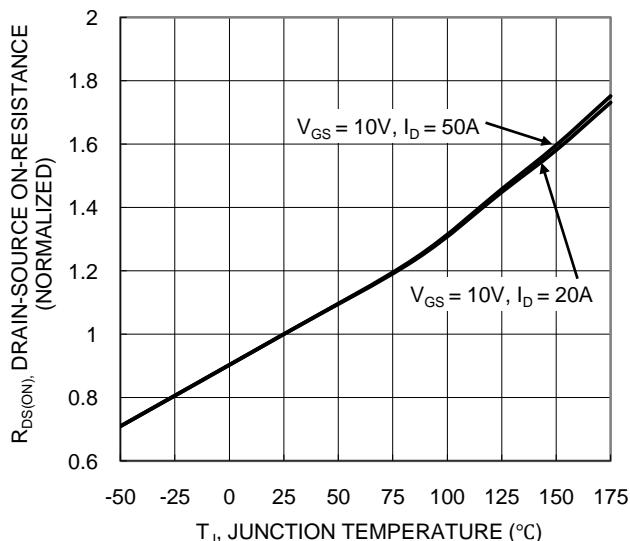


Figure 6. On-Resistance Variation with Temperature

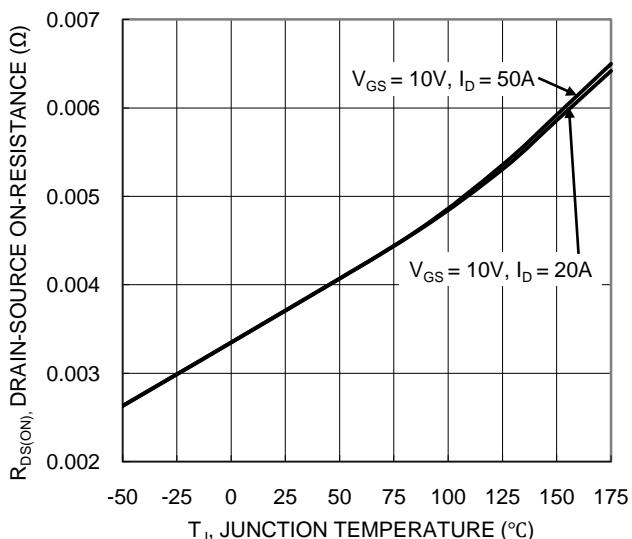


Figure 7. On-Resistance Variation with Temperature

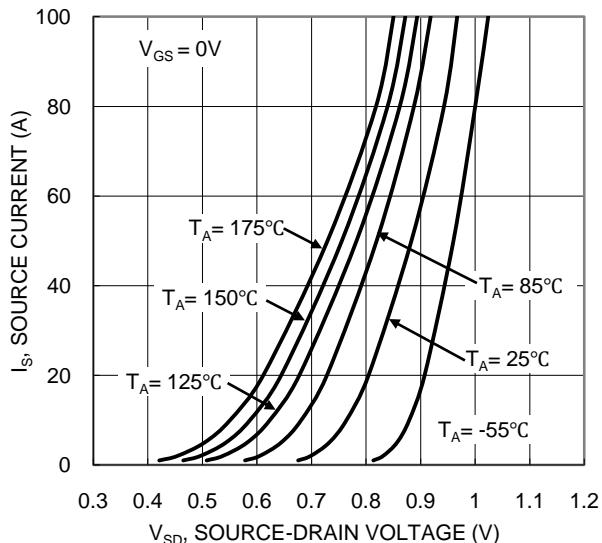


Figure 9. Diode Forward Voltage vs. Current

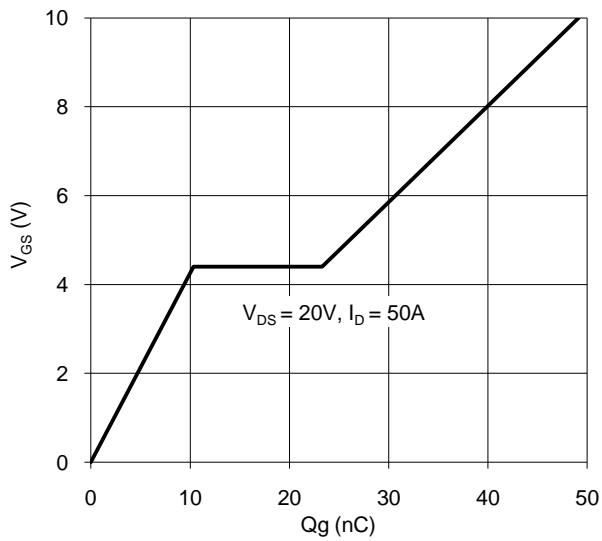


Figure 11. Gate Charge

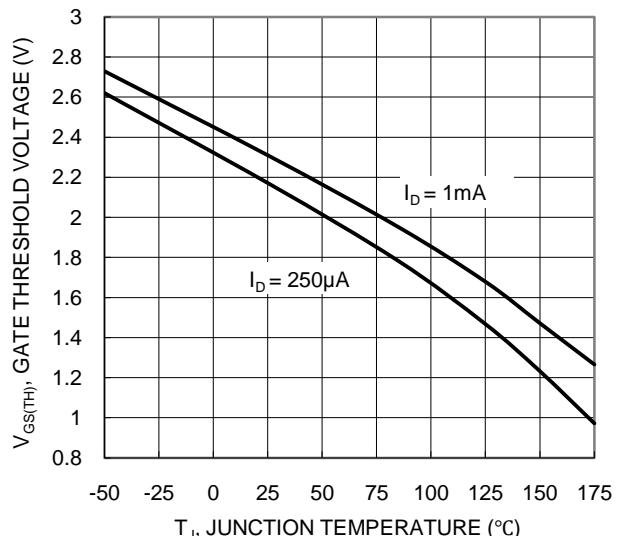


Figure 8. Gate Threshold Variation vs. Temperature

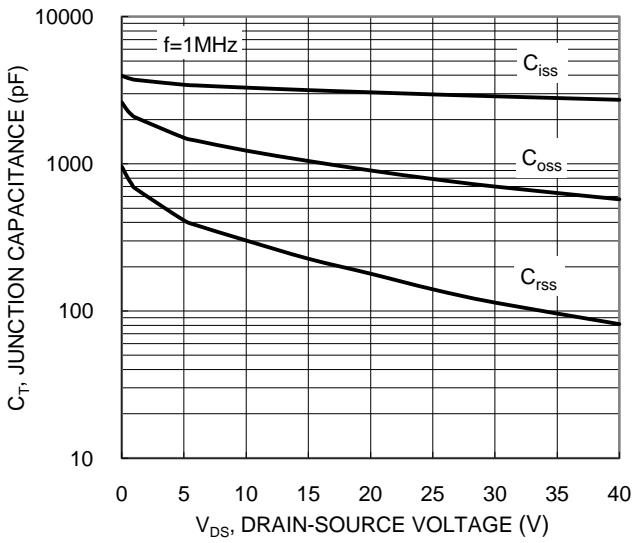


Figure 10. Typical Junction Capacitance

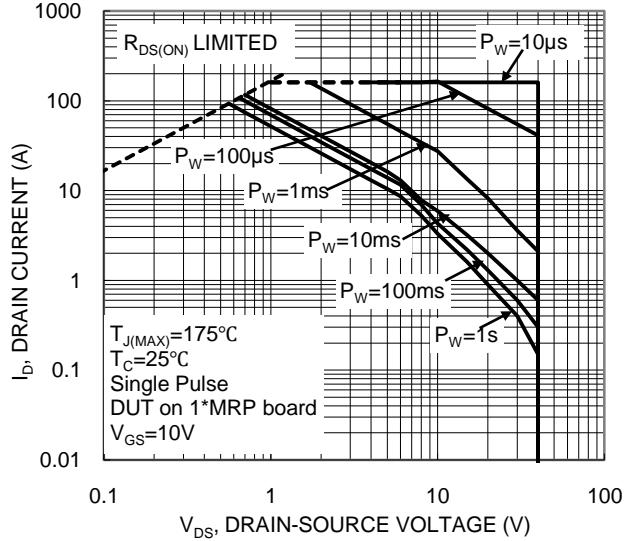


Figure 12. SOA, Safe Operation Area

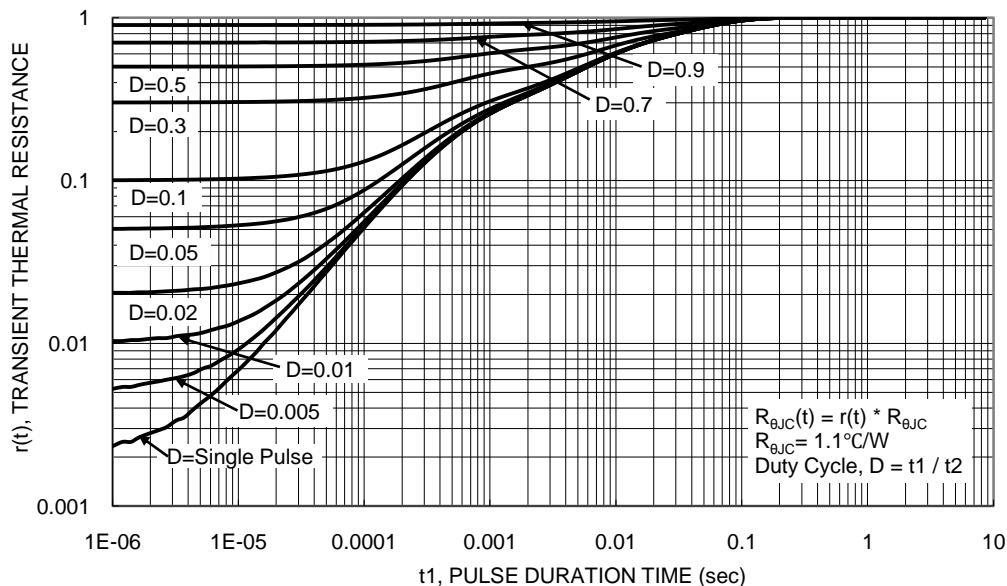
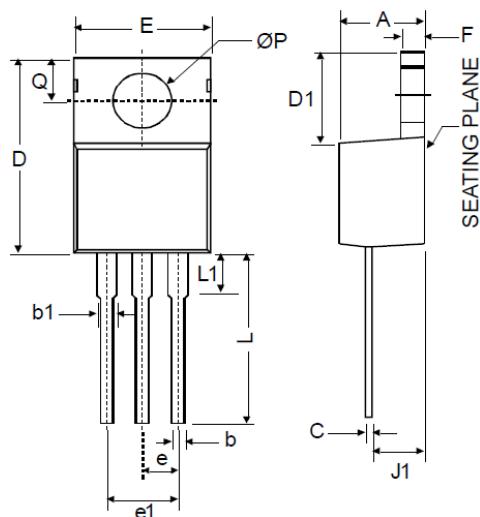


Figure 13. Transient Thermal Resistance

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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