60V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C (Note 9)
60V	3.4mΩ @ V_{GS} = 10V	100A

Description

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

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Minimizes Power Losses
- Low Q_g – Minimizes Switching Losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DMTH6004SCTBQ)**

Applications

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

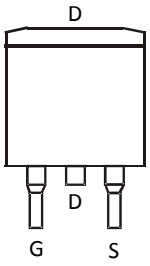
Mechanical Data

- Case: TO263AB
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 1.7 grams (Approximate)

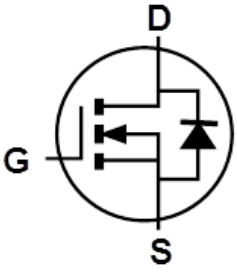


Top View

TO263AB



Pin Out Top View



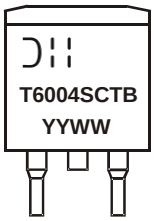
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH6004SCTB-13	TO263AB	800 / Tape & Reel

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



T6004SCTB = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 15 = 2015)
WW = Week (01 to 53)

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 6)	T_C = +25°C (Note 9) T_C = +100°C	I_D	100 100	A
Maximum Continuous Body Diode Forward Current (Note 6)	T_C = +25°C	I_S	100	A
Pulsed Drain Current (10µs Pulse, Duty Cycle=1%)		I_{DM}	200	A
Avalanche Current, L=0.2mH		I_{AS}	45	A
Avalanche Energy, L=0.2mH		E_{AS}	200	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	4.7	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	32	°C/W
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	136	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.1	°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}	60	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, 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	$R_{DS(ON)}$	—	2.9	3.4	mΩ	V_{GS} = 10V, I_D =100A
Diode Forward Voltage	V_{SD}	—	—	1.3	V	V_{GS} = 0V, I_S = 100A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	4,556	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	1,383	—		
Reverse Transfer Capacitance	C_{rss}	—	105.2	—		
Gate Resistance	R_g	—	0.66	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	95.4	—	nC	V_{DD} = 30V, I_D = 90A, V_{GS} = 10V
Gate-Source Charge	Q_{gs}	—	21.6	—		
Gate-Drain Charge	Q_{gd}	—	20.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	13.2	—	ns	V_{DD} = 30V, V_{GS} = 10V, I_D =90A, R_G = 3.5Ω
Turn-On Rise Time	t_R	—	11.7	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	31	—		
Turn-Off Fall Time	t_F	—	12	—		
Reverse Recovery Time	t_{RR}	—	50.5	—	ns	I_F=50A, di/dt=100A/µs
Reverse Recovery Charge	Q_{RR}	—	80.8	—	nC	

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.
9. Package limited.

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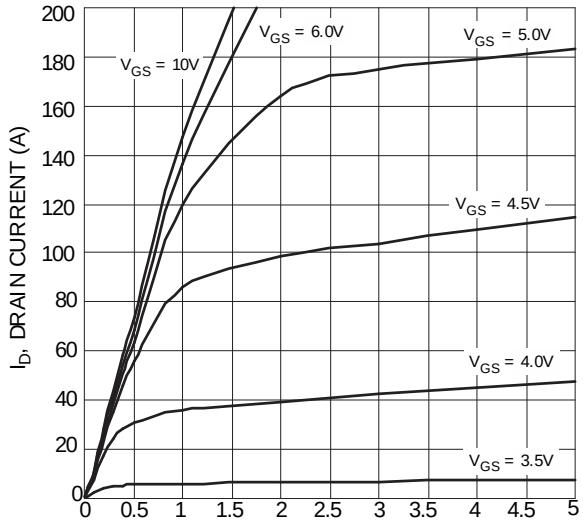


Figure 1 Typical Output Characteristics

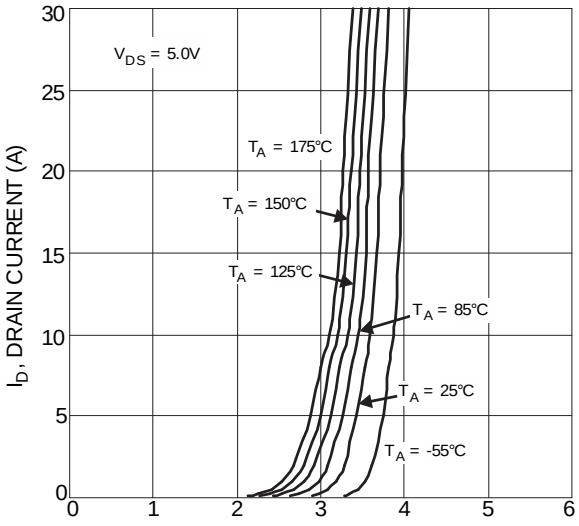


Figure 2 Typical Transfer Characteristics

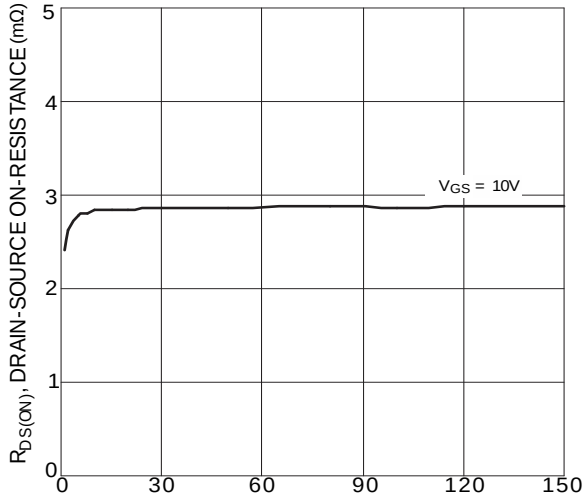


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

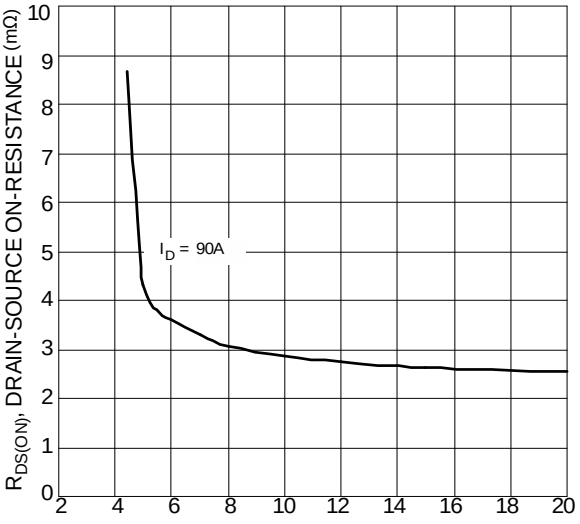


Figure 4 Typical Transfer Characteristic

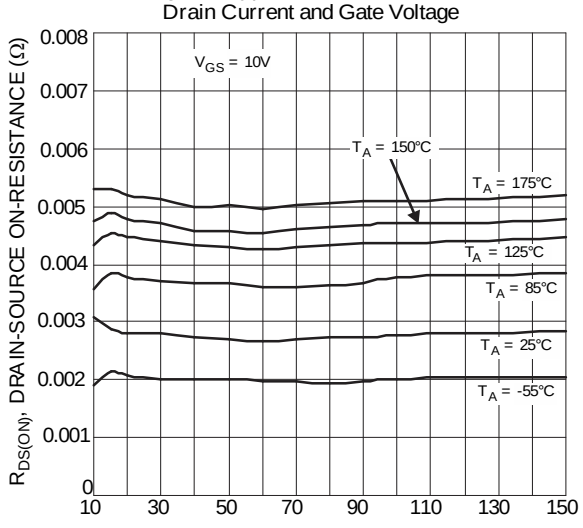


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

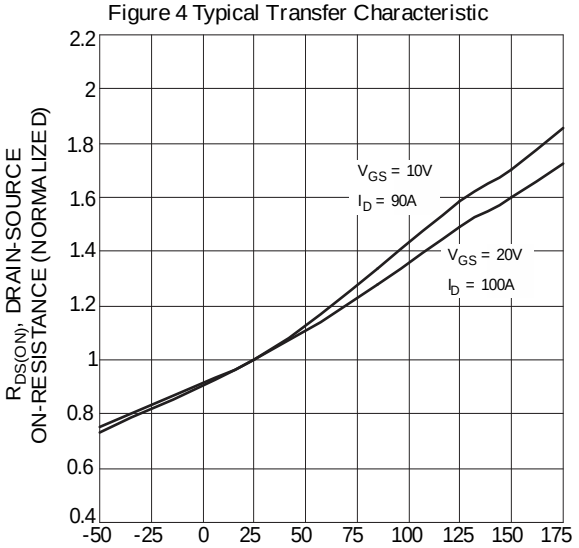


Figure 6 On-Resistance Variation with Temperature

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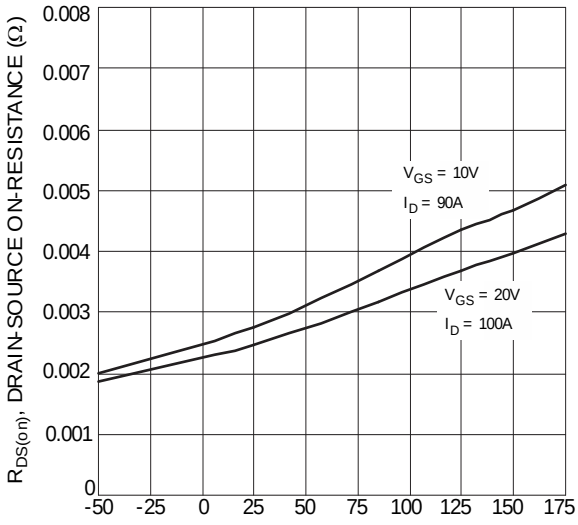


Figure 7 On-Resistance Variation with Temperature

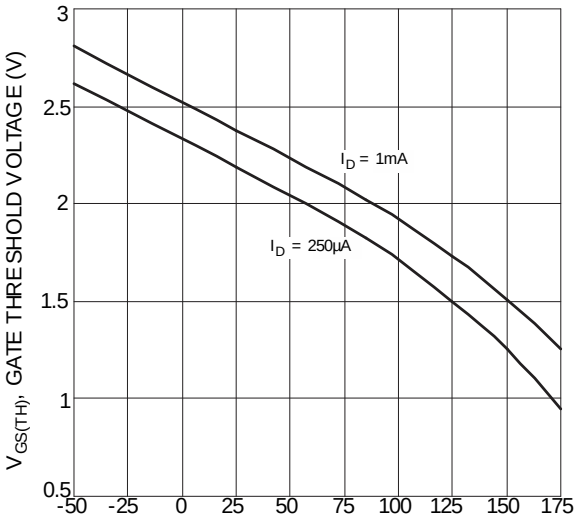


Figure 8 Gate Threshold Variation vs. Temperature

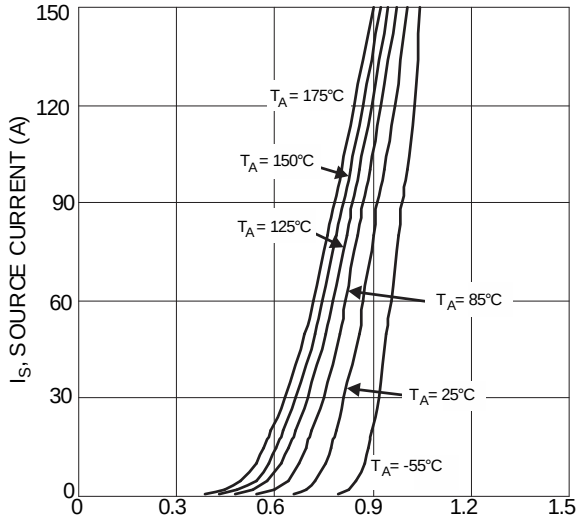


Figure 9 Diode Forward Voltage vs. Current

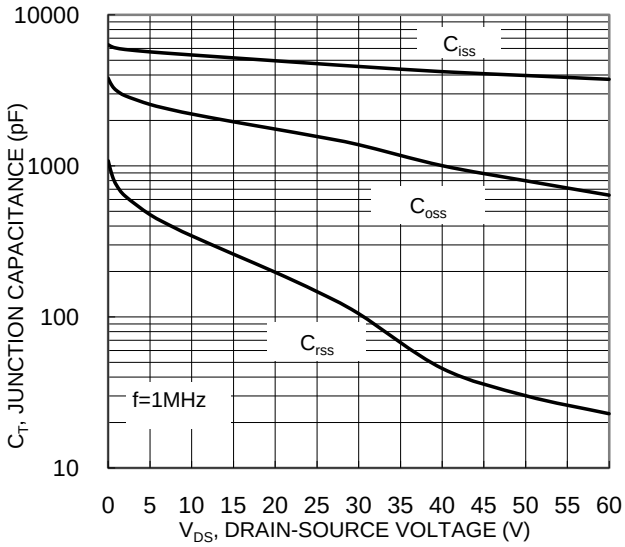


Figure 10. Typical Junction Capacitance

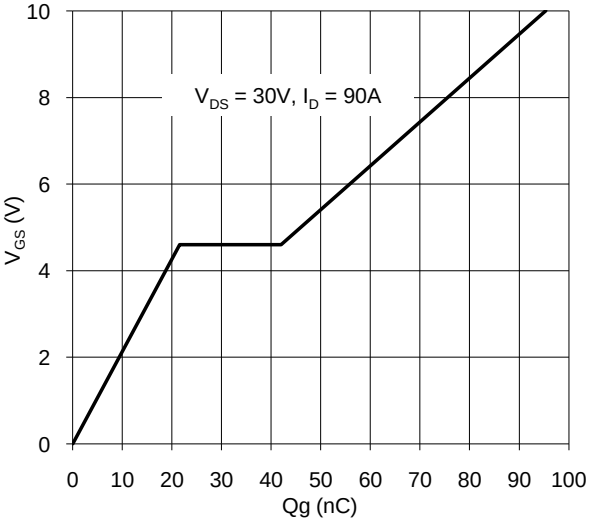


Figure 11. Gate Charge

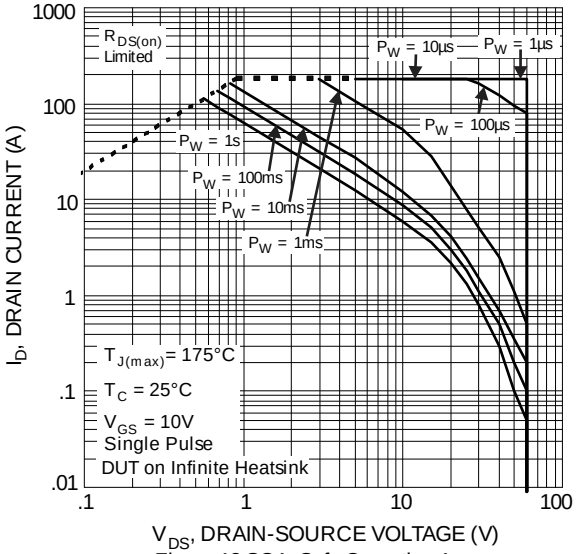


Figure 12 SOA, Safe Operation Area

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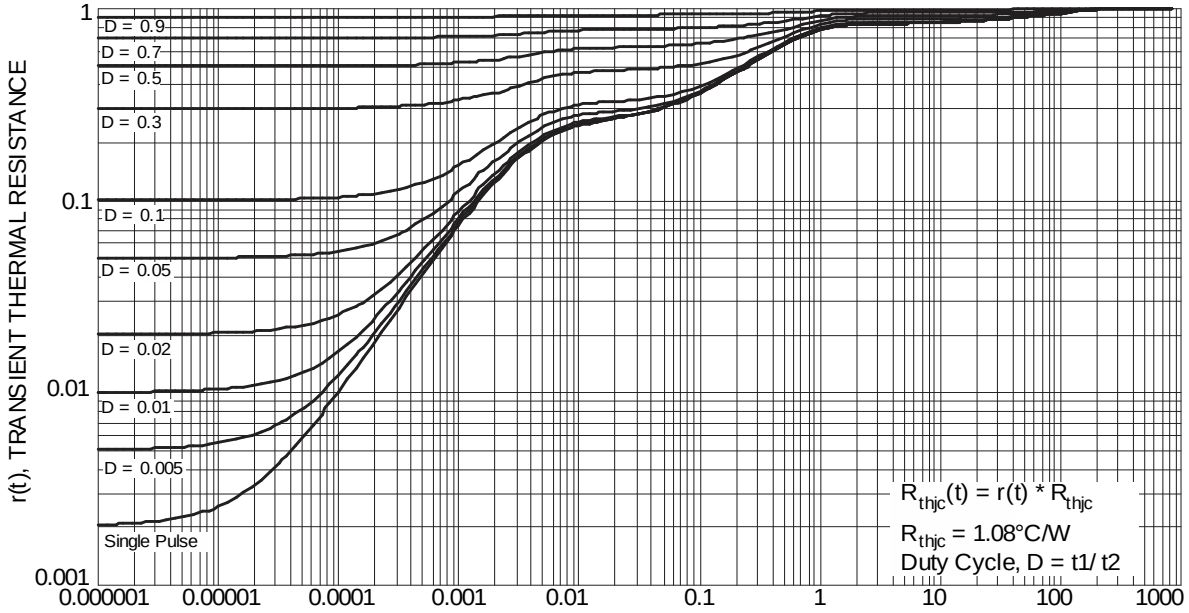


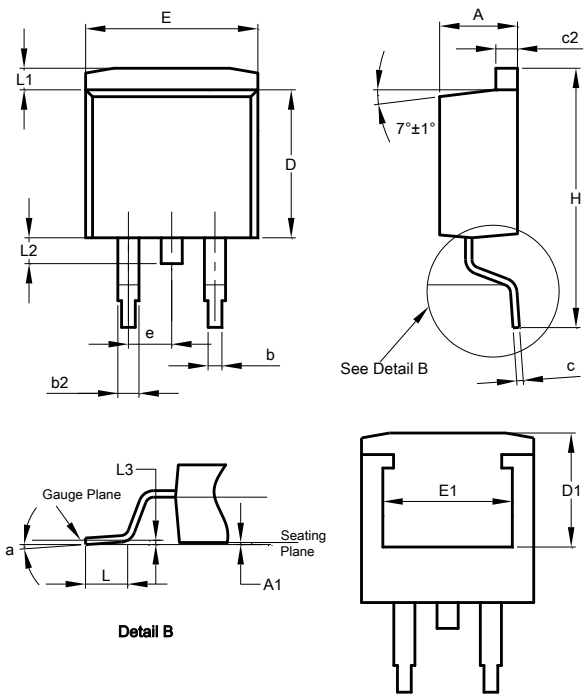
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

TO263AB (D2PAK)

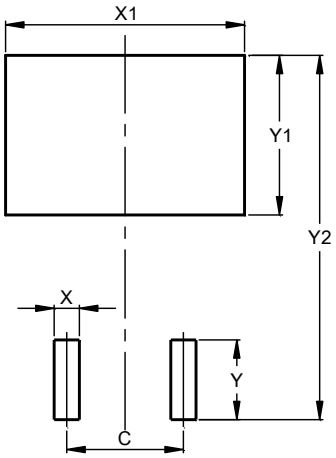


TO263AB (D2PAK)			
Dim	**Min**	**Max**	**Typ**
A	4.07	4.82	—
A1	0.00	0.25	—
b	0.51	0.99	—
b2	1.15	1.77	—
c	0.356	0.73	—
c2	1.143	1.65	—
D	8.39	9.65	—
D1	6.55	6.95	—
e	2.54 TYP		
E	9.66	10.66	—
E1	6.23	8.23	—
H	14.61	15.87	—
L	1.78	2.79	—
L1	—	1.67	—
L2	—	1.77	—
L3	—	—	0.254
a	0°	8°	—
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

TO263AB (D2PAK)



Dimensions	Value (in mm)
C	5.08
X	1.10
X1	10.41
Y	3.50
Y1	7.01
Y2	15.99

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