60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C
-60V	110mΩ @ V_{GS} = -10V	-14A
	140mΩ @ V_{GS} = -4.5V	-12A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DMP6180SK3Q)**

Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

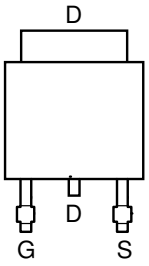
- DC-DC converters
- Power management functions
- Analog switches

Mechanical Data

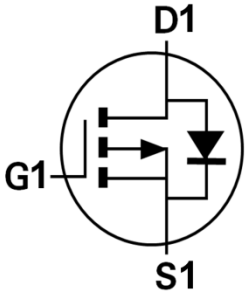
- Package: TO252
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

TO252 (DPAK)

Top View



Top View



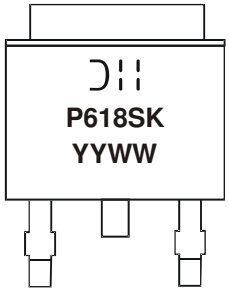
Internal Schematic

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP6180SK3-13	TO252 (DPAK)	2,500	Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



= Manufacturer's Marking
P618SK = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 22 = 2022)
WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 5) V_{GS} = -10V	Steady State	T_C = +25°C T_C = +100°C	I_D	-14 -10	A
Maximum Body Diode Forward Current (Note 5)			I_S	-4.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-25	A

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.0	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	76	°C/W
	t < 10s		33	
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	2.7	W
	T_A = +70°C		1.5	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	50	°C/W
	t < 10s		24	
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	40	W
	T_C = +100°C		16	
Thermal Resistance, Junction to Case (Note 5)	Steady State	$R_{\theta JC}$	3.1	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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 = -250µA
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	$V_{GS(TH)}$	-1.2	—	-2.7	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	60	110	mΩ	V_{GS} = -10V, I_D = -12A
		—	80	140		V_{GS} = -4.5V, I_D =-8A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	15	—	S	V_{DS} = -5V, I_D = -12A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	984.7	—	pF	V_{DS} = -30V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	58	—		
Reverse Transfer Capacitance	C_{rss}	—	45.5	—		
Gate Resistance	R_G	—	12.9	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	8.1	—	nC	V_{DS} = -30V, I_D = -12A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	17.1	—		
Gate-Source Charge	Q_{gs}	—	3.2	—		
Gate-Drain Charge	Q_{gd}	—	3.9	—		
Turn-On Delay Time	$t_{D(on)}$	—	5.9	—	ns	V_{GS} = -10V, V_{DS} = -30V, R_{GEN} = 3Ω R_L = 2.5Ω
Turn-On Rise Time	t_r	—	21.2	—		
Turn-Off Delay Time	$t_{D(off)}$	—	30.9	—		
Turn-Off Fall Time	t_f	—	39.1	—		
Body Diode Reverse Recovery Time	t_{rr}	—	19.9	—	ns	I_S = -12A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	1.7	—	nC	I_S = -12A, dI/dt = 100A/µs

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

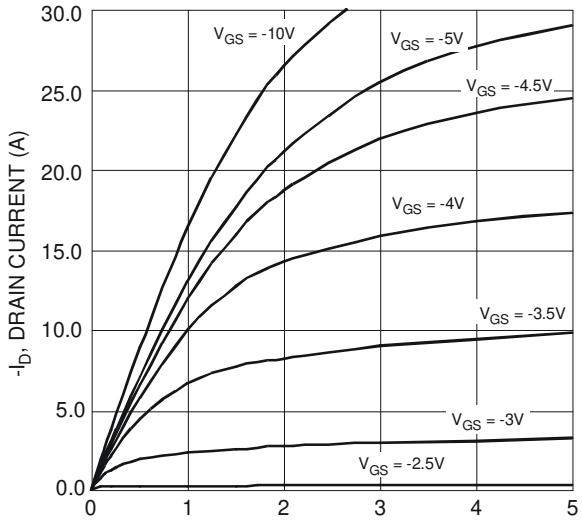


Figure 1 Typical Output Characteristics

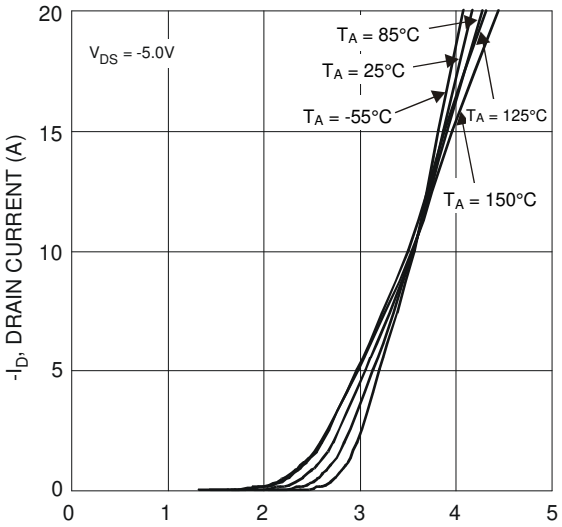


Figure 2 Typical Transfer Characteristics

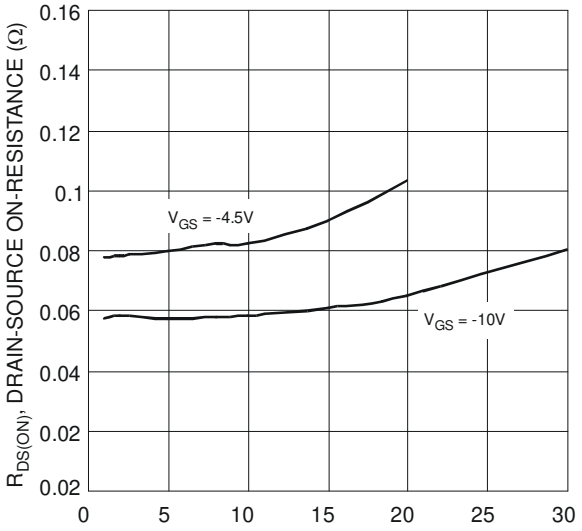


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

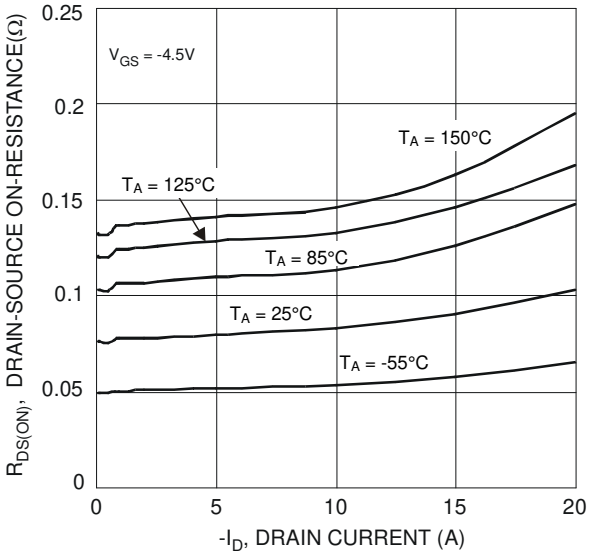


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

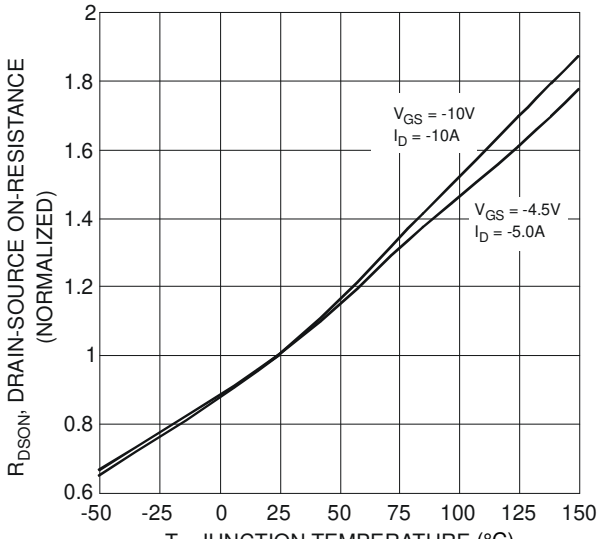


Figure 5 On-Resistance Variation with Temperature

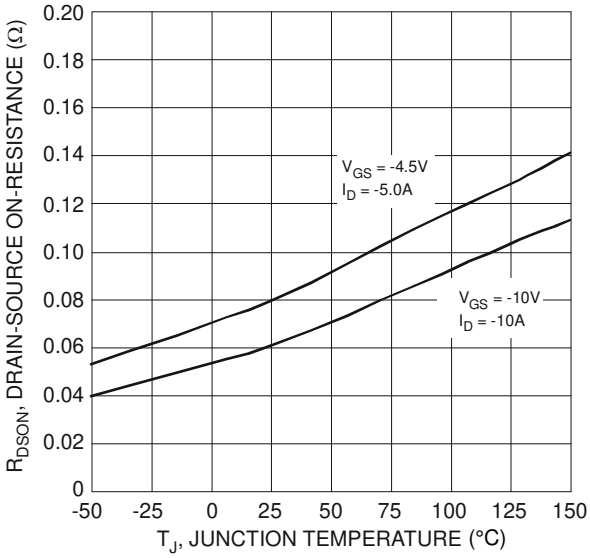


Figure 6 On-Resistance Variation with Temperature

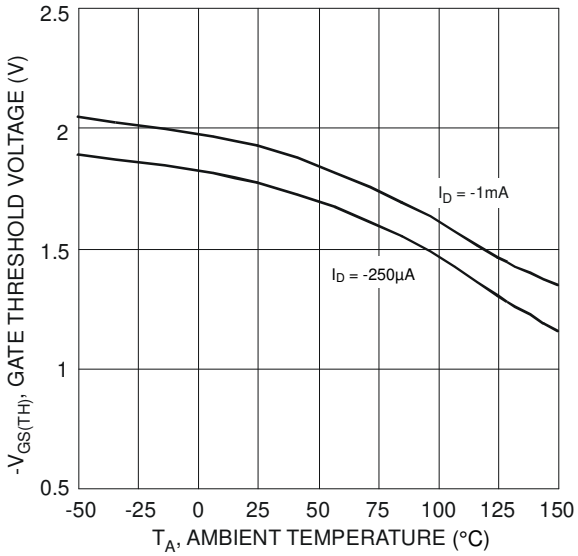


Figure 7 Gate Threshold Variation vs. Ambient Temperature

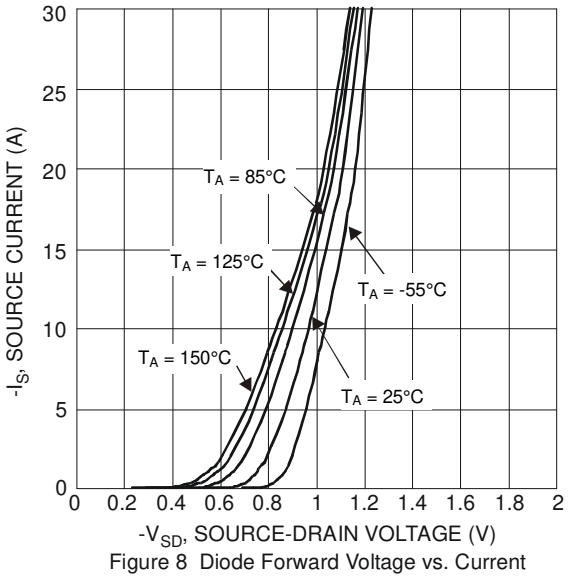


Figure 8 Diode Forward Voltage vs. Current

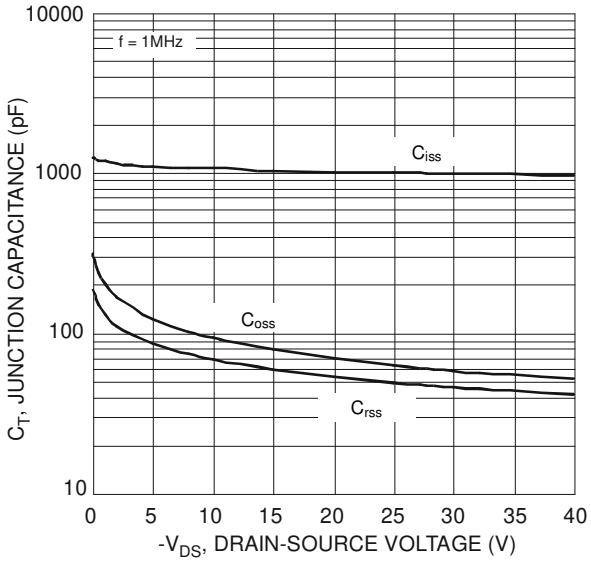


Figure 9 Typical Junction Capacitance

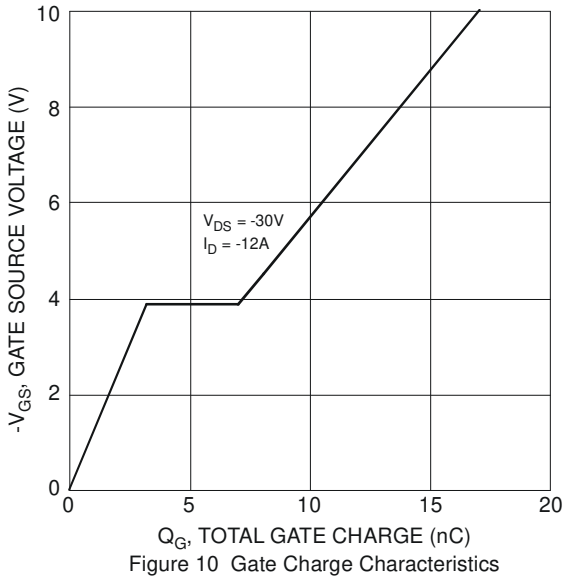


Figure 10 Gate Charge Characteristics

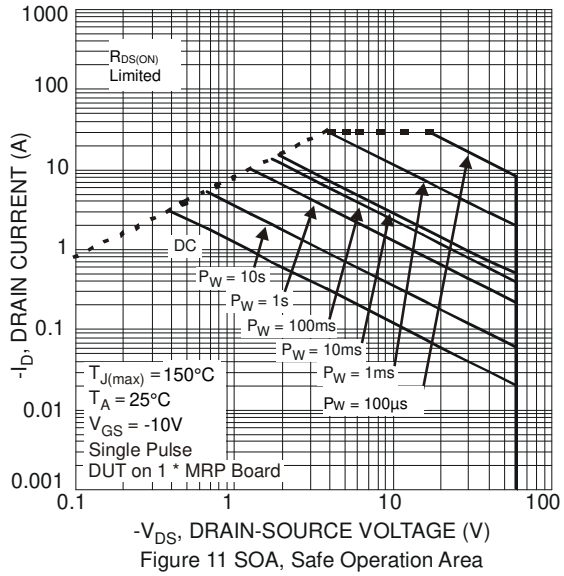


Figure 11 SOA, Safe Operation Area

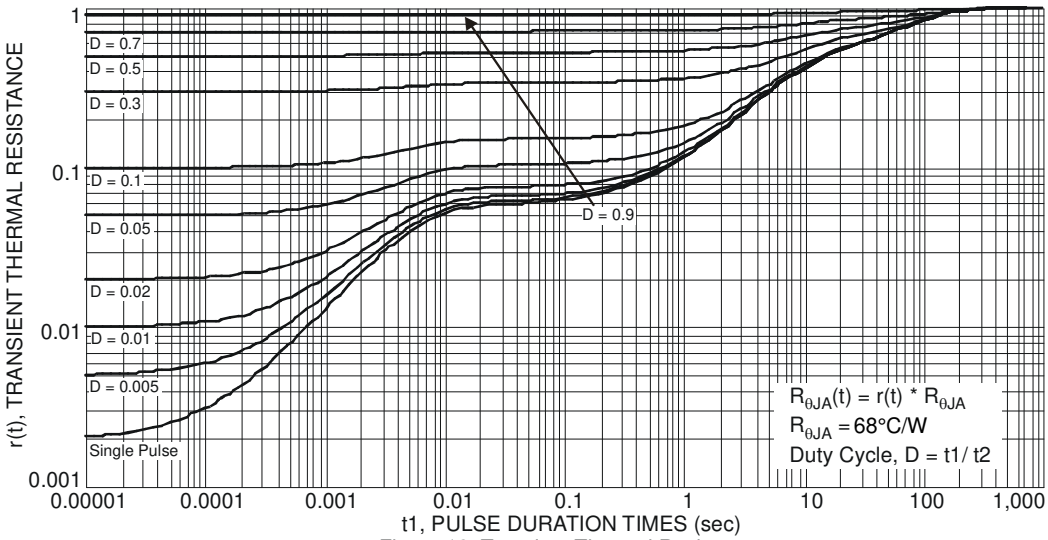
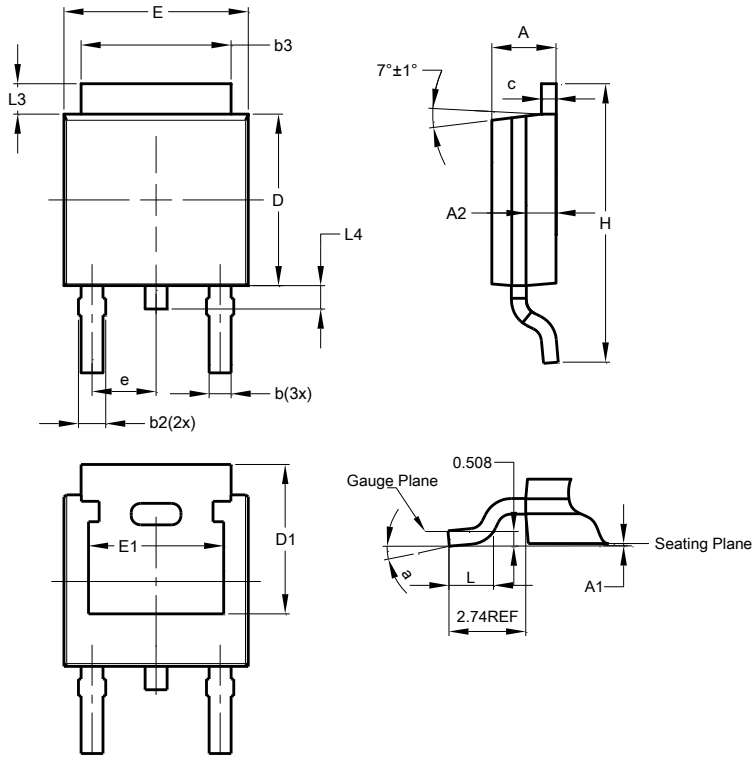


Figure 12 Transient Thermal Resistance

Package Outline Dimensions

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

TO252 (DPAK)

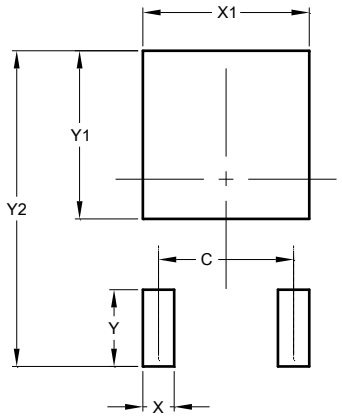


TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.50	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	--	--
e	2.286 BSC		
E	6.45	6.70	6.58
E1	4.32	--	--
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	--
All Dimensions in mm			

Suggested Pad Layout

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

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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