

## Product Summary

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> MAX T <sub>A</sub> = +25°C
N-Channel	12V	25mΩ @ V <sub>GS</sub> = 4.5V	6.9A
		30mΩ @ V <sub>GS</sub> = 2.5V	6.3A
		38mΩ @ V <sub>GS</sub> = 1.8V	5.5A

## Description

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(on)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

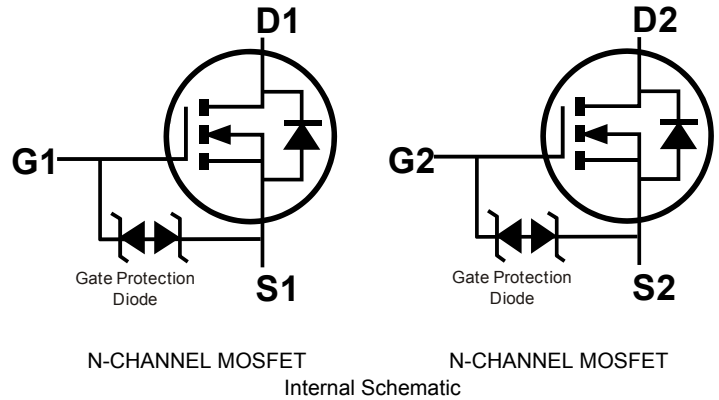
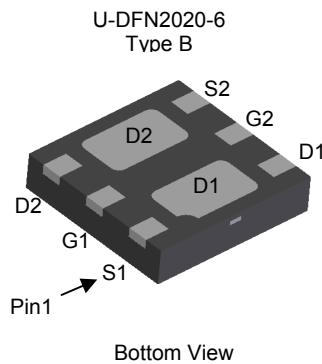
- Load Switch
- Power Management Functions
- Portable Power Adaptors

## Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height
- ESD protected gate.
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: U-DFN2020-6 Type B
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (approximate)

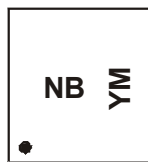


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1025UFDB-7	U-DFN2020-6 Type B	3000/Tape & Reel
DMN1025UFDB-13	U-DFN2020-6 Type B	10000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  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/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).

## Marking Information



NB = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2012	2013	2014	2015	2016	2017	2018
Code	Z	A	B	C	D	E	F

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic	Symbol	Value	Units	
Drain-Source Voltage	V <sub>DSS</sub>	12	V	
Gate-Source Voltage	V <sub>GSS</sub>	±10	V	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	6.9	A
		T <sub>A</sub> = +70°C	5.5	
	t < 5s	T <sub>A</sub> = +25°C	8.8	A
		T <sub>A</sub> = +70°C	7.0	
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	1	A	
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I <sub>DM</sub>	35	A	
Avalanche Current (Note 6) L = 0.1mH	I <sub>AS</sub>	9.8	A	
Avalanche Energy (Note 6) L = 0.1mH	E <sub>AS</sub>	4.8	mJ	

**Thermal Characteristics**

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)	P <sub>D</sub>	Steady State	1.7	W
		t < 5s	2.9	
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	71	°C/W
		t < 5s	43	
Thermal Resistance, Junction to Case (Note 5)	R <sub>θJC</sub>	13		
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C	

**Electrical Characteristics N-CHANNEL** (@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>	12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.4	—	1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	18	25	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.2A
		—	20	30		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4.8A
		—	25	38		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 2.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 5.4A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	917	—	pF	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	120	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	102	—	pF	
Gate Resistance	R <sub>g</sub>	—	11.4	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	12.6	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6.8A
Total Gate Charge (V <sub>GS</sub> = 8V)		—	23.1	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	1.3	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.6	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	3.0	—	ns	
Turn-On Rise Time	t <sub>r</sub>	—	9.3	—	ns	V <sub>DD</sub> = 6V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 1.1Ω, R <sub>G</sub> = 1Ω
Turn-Off Delay Time	t <sub>D(off)</sub>	—	17.2	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	2.8	—	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	6.8	—	nS	I <sub>S</sub> = 5.4A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	1.1	—	nC	I <sub>S</sub> = 5.4A, dI/dt = 100A/μs

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

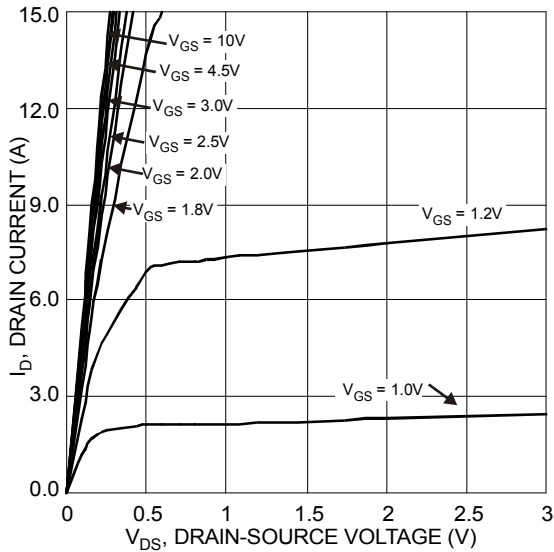


Figure 1 Typical Output Characteristic

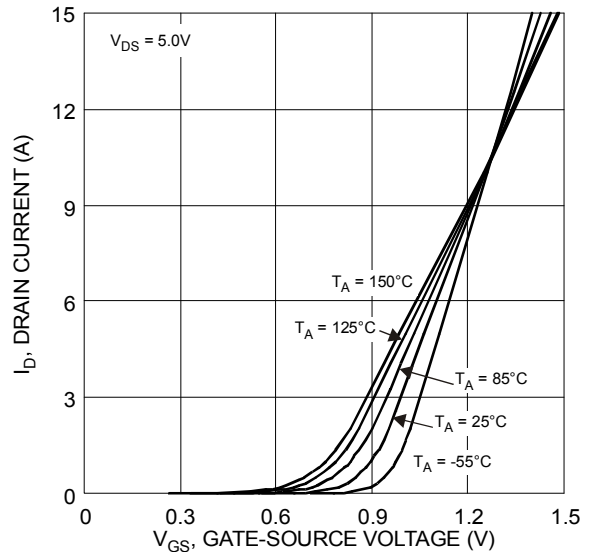


Figure 2 Typical Transfer Characteristics

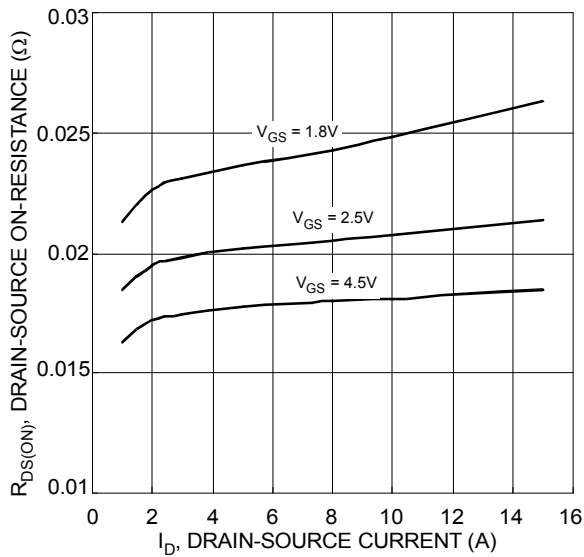


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

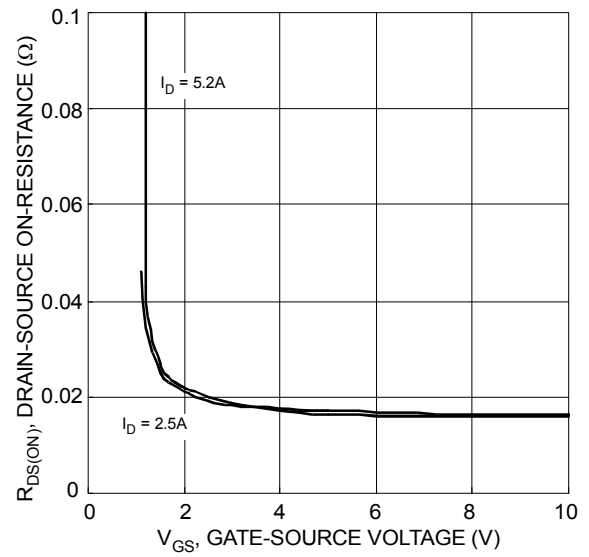


Figure 4 Typical Transfer Characteristic

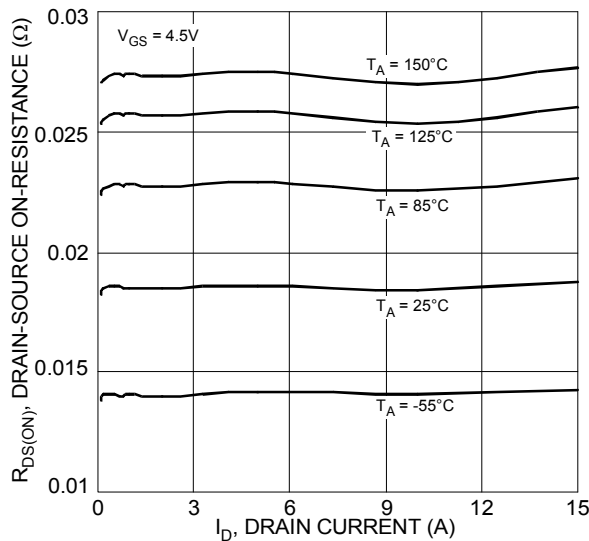


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

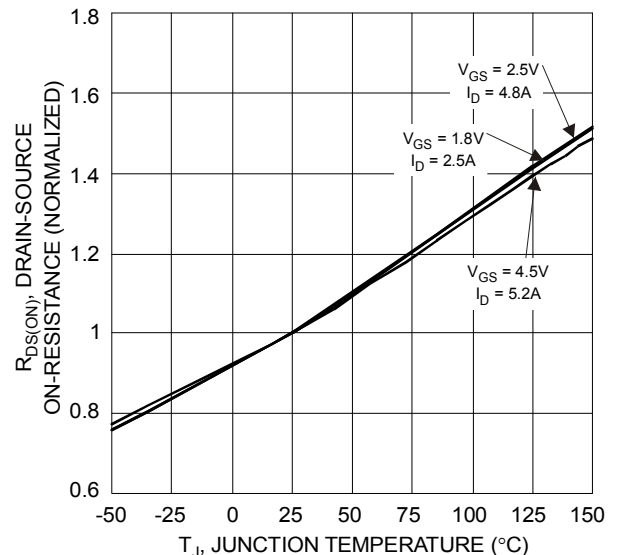


Figure 6 On-Resistance Variation with Temperature

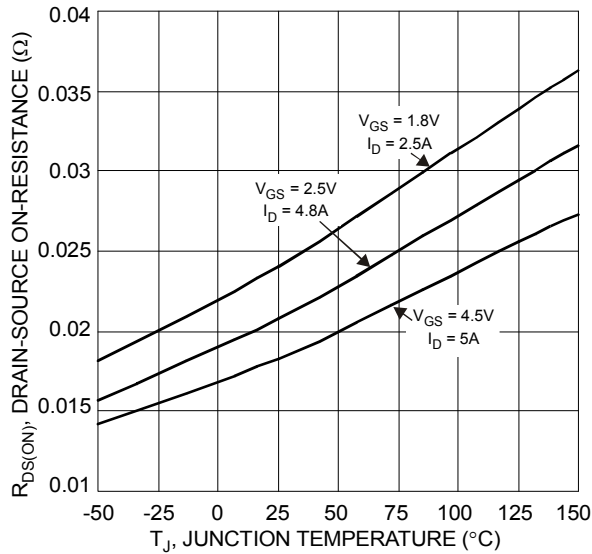


Figure 7 On-Resistance Variation with Temperature

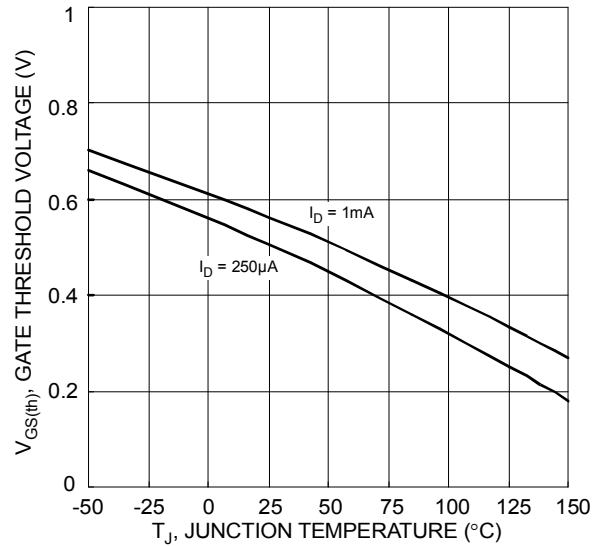


Figure 8 Gate Threshold Variation vs. Ambient Temperature

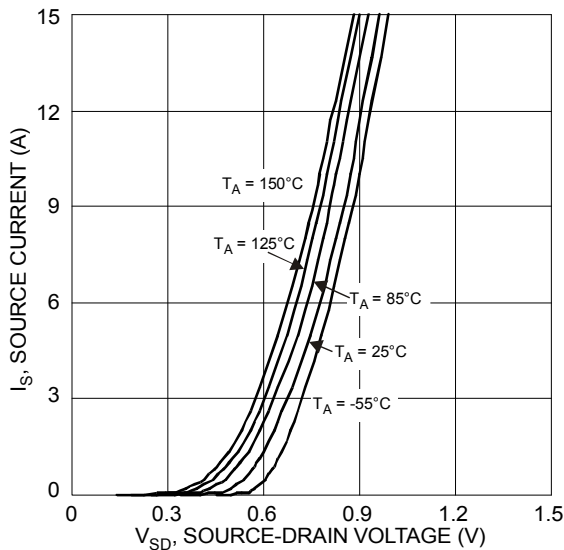


Figure 9 Diode Forward Voltage vs. Current

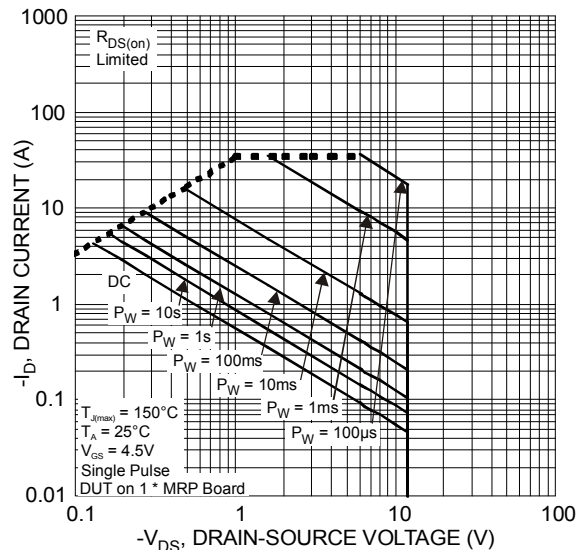


Figure 10 SOA, Safe Operation Area

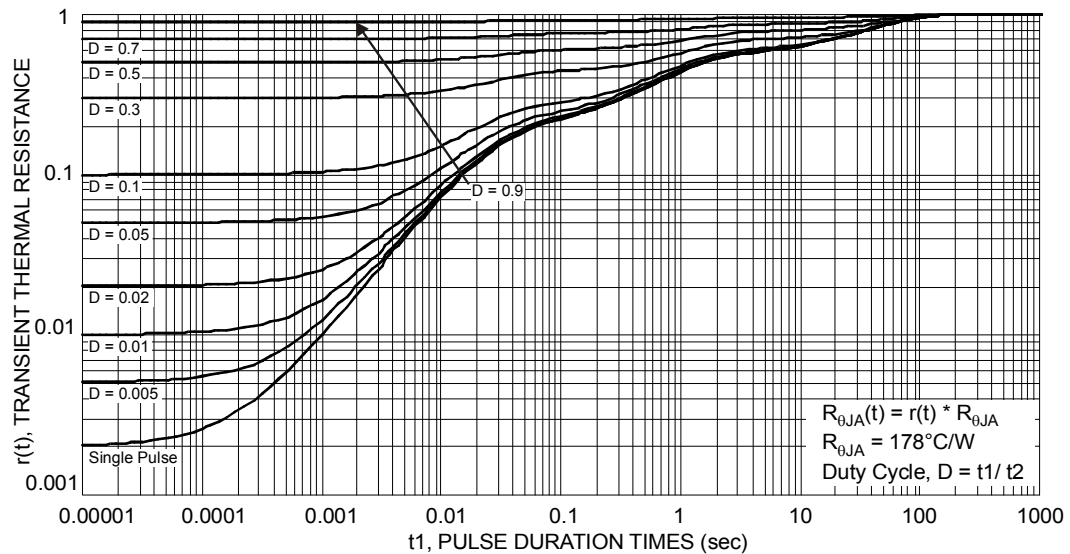
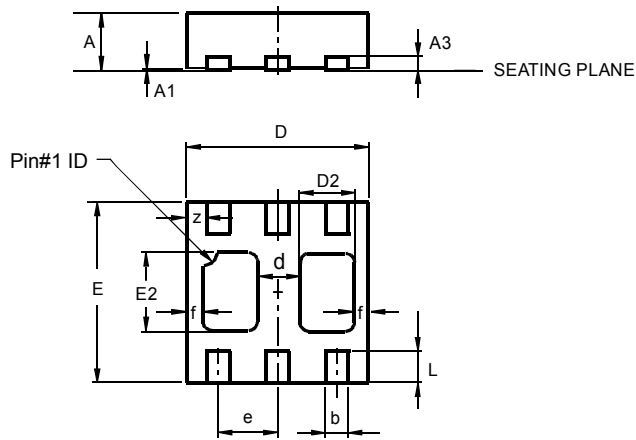


Figure 11 Transient Thermal Resistance

**Package Outline Dimensions**

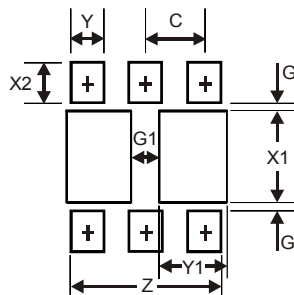
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
d	—	—	0.45
D2	0.50	0.70	0.60
e	—	—	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
f	—	—	0.15
L	0.25	0.35	0.30
z	—	—	0.225
All Dimensions in mm			

**Suggested Pad Layout**

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



Dimensions	Value (in mm)
Z	1.67
G	0.20
G1	0.40
X1	1.0
X2	0.45
Y	0.37
Y1	0.70
C	0.65

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