

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
30V	760m $\Omega$ @ $V_{GS} = 4.5V$	0.65A
	930m $\Omega$ @ $V_{GS} = 2.5V$	0.58A
	1500m $\Omega$ @ $V_{GS} = 1.8V$	0.45A

## Description

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

## Applications

- Load switch
- Portable applications
- Power Management Functions

## Features

- 0.4mm ultra low profile package for thin application
- 0.48mm<sup>2</sup> package footprint, 16 times smaller than SOT23
- Low  $V_{GS(th)}$ , can be driven directly from a battery
- Low  $R_{DS(on)}$
- **ESD Protected**
- **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

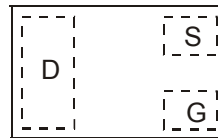
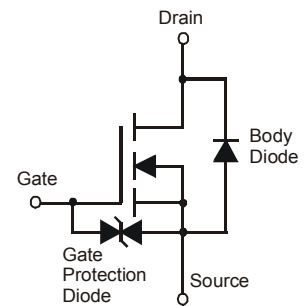
- Case: X2-DFN0806-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Weight: 0.00043 grams (approximate)



X2-DFN0806-3



Bottom View


 Top View  
Package Pin Configuration


Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN3900UFA-7B	NU	7	8	10,000

- 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/products/packages.html>.

## Marking Information

DMN3900UFA-7B


 Top View  
Bar Denotes Gate  
and Source Side

NU = Product Type Marking Code

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V <sub>DSS</sub>	30	V
Gate-Source Voltage		V <sub>GSS</sub>	±8	
Continuous Drain Current	V <sub>GS</sub> = 4.5V	(Note 6)	0.65	A
		T <sub>A</sub> = +70°C (Note 6)	0.52	
		(Note 5)	0.55	
Pulsed Drain Current		(Note 7)	I <sub>DM</sub>	

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	490	mW
	(Note 5)		390	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	255	°C/W
	(Note 5)		327	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	3	μA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.45	—	0.95	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	400	760	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 200mA
			480	930		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 100mA
			617	1500		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 75mA
Forward Transfer Admittance	Y <sub>fs</sub>	40	—	—	mS	V <sub>DS</sub> = 3V, I <sub>D</sub> = 10mA
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	42.2	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	4.5	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	3.4	—	pF	
Gate Resistance	R <sub>g</sub>	—	468	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	—	0.7	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 200mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.11	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.15	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	10.5	—	ns	V <sub>DS</sub> = 10V, I <sub>D</sub> = 200mA V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	—	7.8	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	80.6	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	23.4	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Device mounted on FR-4 PCB, with minimum recommended pad layout, except the device measured at t ≤ 10 sec.
  - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing

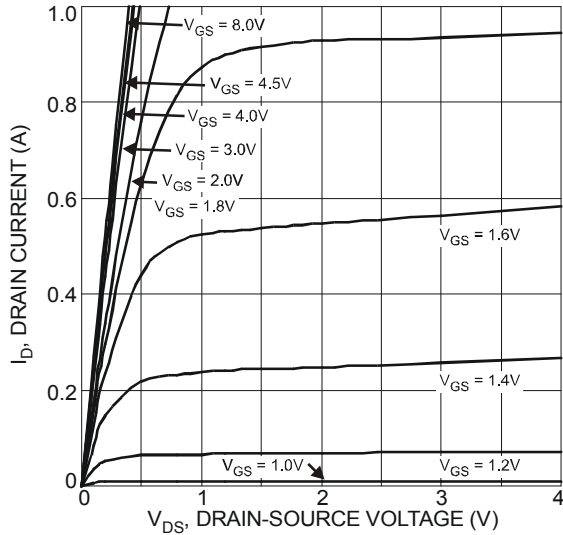


Fig. 1 Typical Output Characteristic

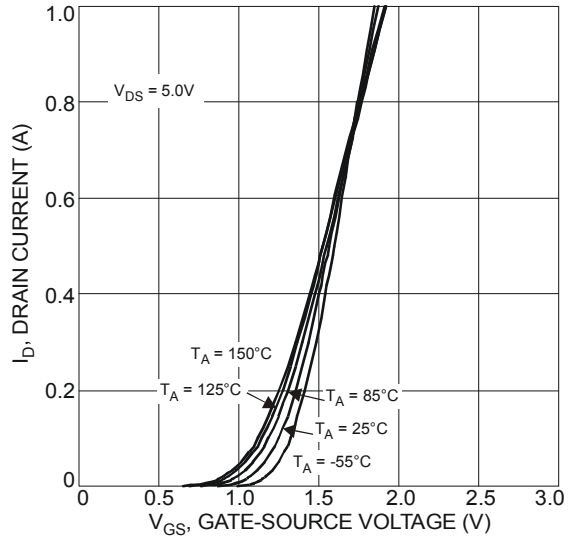


Fig. 2 Typical Transfer Characteristics

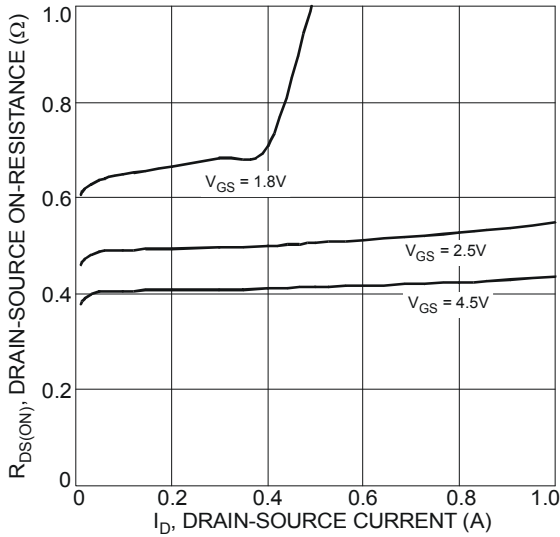


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

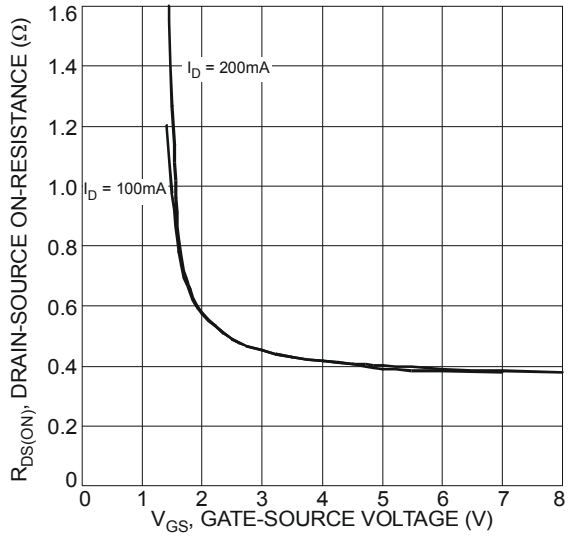


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

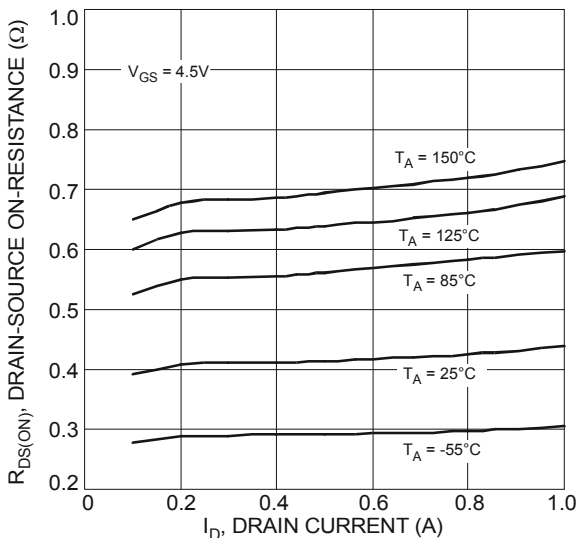


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

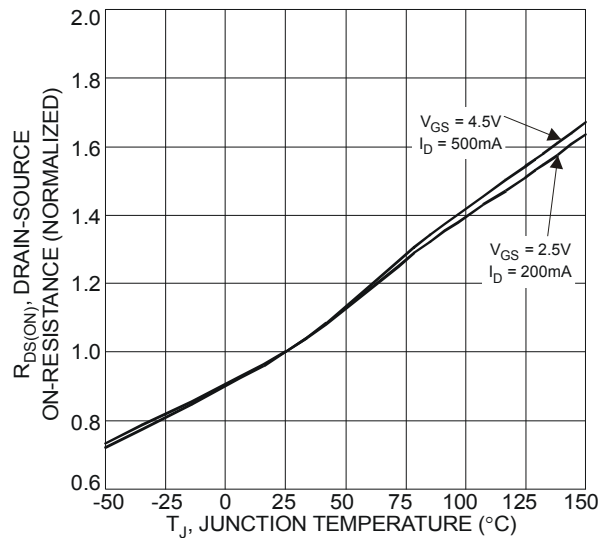


Fig. 6 On-Resistance Variation with Temperature

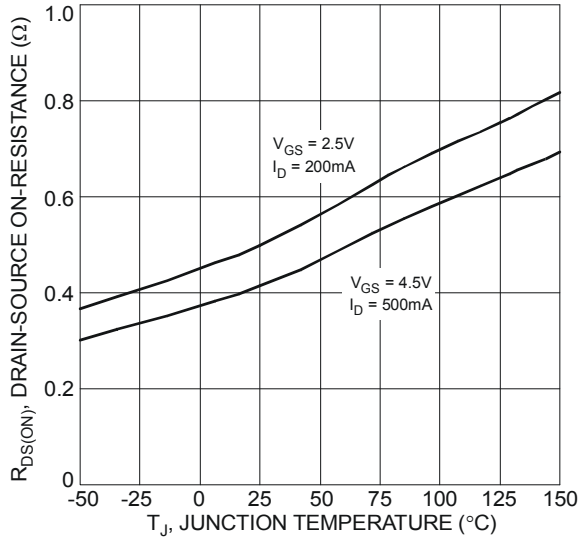


Fig. 7 On-Resistance Variation with Temperature

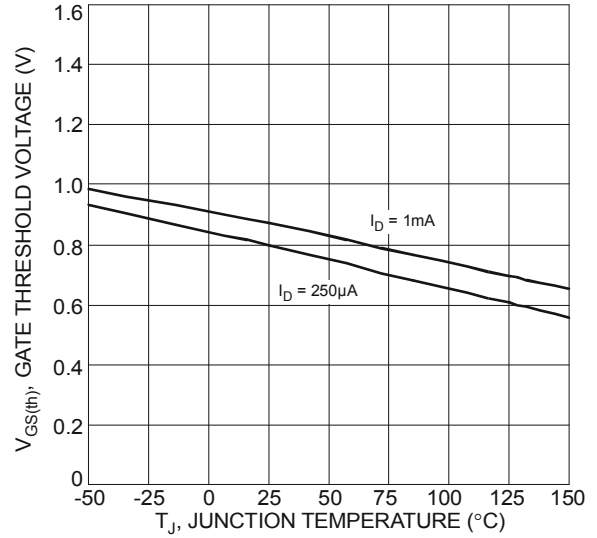


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

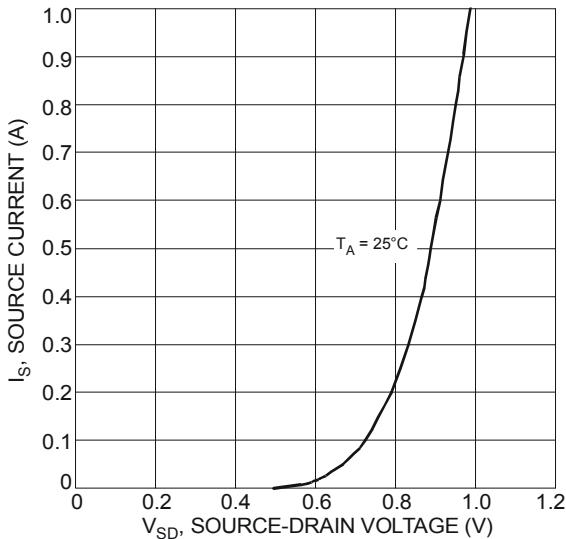


Fig. 9 Diode Forward Voltage vs. Current

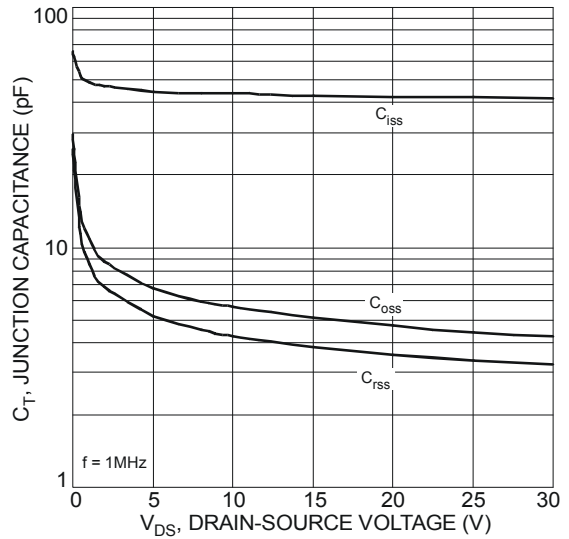


Fig. 10 Typical Junction Capacitance

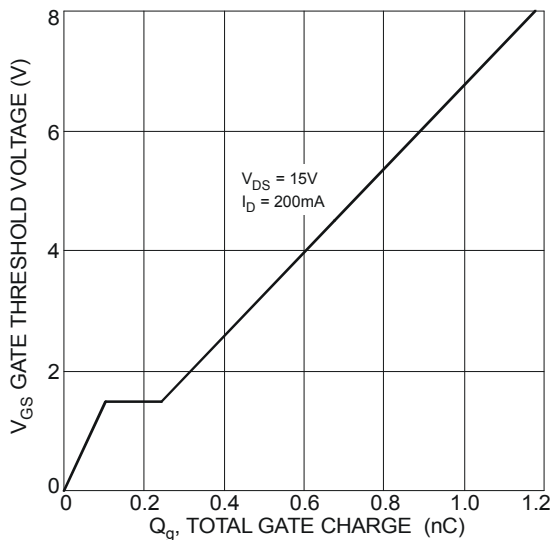


Fig. 11 Gate Charge

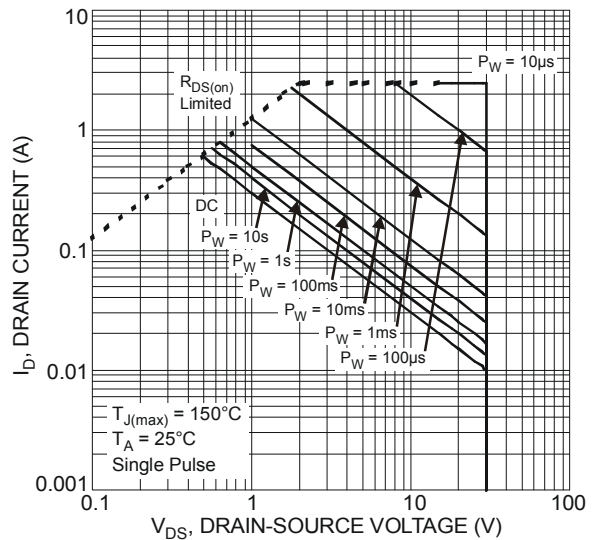
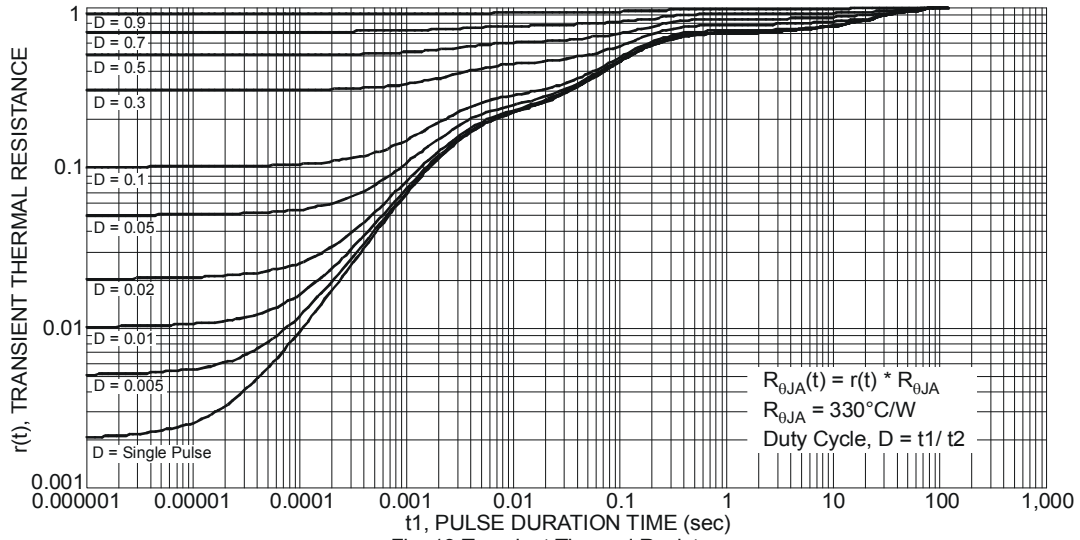
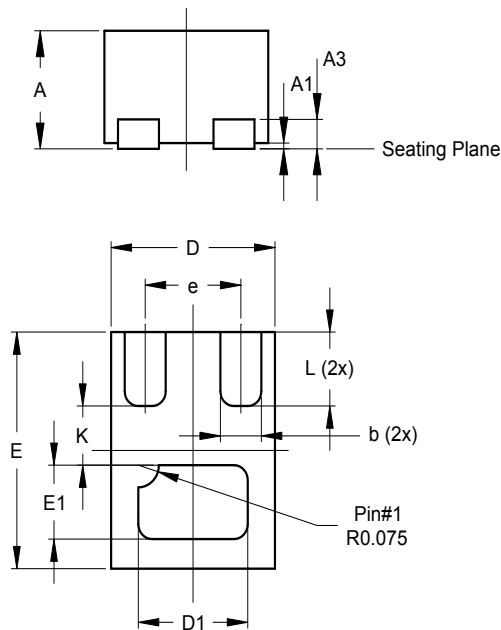


Fig. 12 SOA, Safe Operation Area



**Package Outline Dimensions**

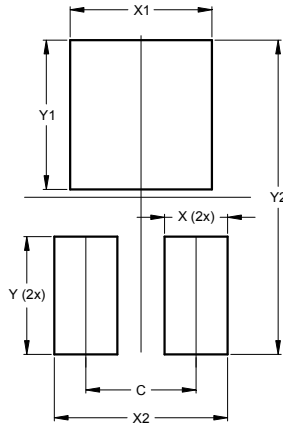
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



X2-DFN0806-3			
Dim	Min	Max	Typ
A	0.375	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.10
b	0.10	0.20	0.15
D	0.55	0.65	0.60
D1	0.35	0.45	0.40
E	0.75	0.85	0.80
E1	0.20	0.30	0.25
e	-	-	0.35
K	-	-	0.20
L	0.20	0.30	0.25
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)
<b>C</b>	0.350
<b>X</b>	0.200
<b>X1</b>	0.450
<b>X2</b>	0.550
<b>Y</b>	0.375
<b>Y1</b>	0.475
<b>Y2</b>	1.000

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