

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
20V	0.99Ω @ V _{GS} = 4.5V	750mA
	1.2Ω @ V _{GS} = 2.5V	680mA
	1.8Ω @ V _{GS} = 1.8V	555mA
	2.4Ω @ V _{GS} = 1.5V	471mA

Description and Applications

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.

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

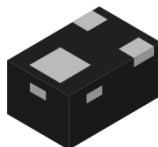
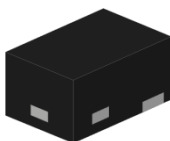
Features and Benefits

- Low Package Profile
- 0.6mm x 0.4mm Package Footprint
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V Max
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

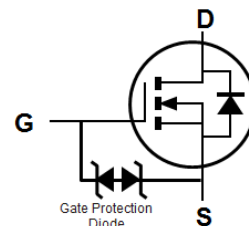
Mechanical Data

- Case: X2-DFN0604-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (Approximate)

X2-DFN0604-3



Top View
Package Pin Configuration



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2990UFO-7B	X2-DFN0604-3	10k/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 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



Top View
Bar Denotes Gate
and Source Side

4N = Product Type Marking Code

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	20	V
Gate-Source Voltage			V _{GSS}	±8	V
Continuous Drain Current (Note 5) V _{GS} = 4.5V	Steady State	T _A = +25°C	I _D	750	mA
		T _A = +85°C		600	
Pulsed Drain Current (Note 6)			I _{DM}	1.5	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	Steady State	P _D	840	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	150	°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}	20	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±5V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.4	0.75	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	0.5	0.99	Ω	V _{GS} = 4.5V, I _D = 100mA
		—	0.6	1.2		V _{GS} = 2.5V, I _D = 50mA
		—	0.8	1.8		V _{GS} = 1.8V, I _D = 20mA
		—	1.0	2.4		V _{GS} = 1.5V, I _D = 10mA
		—	—	—		V _{GS} = 1.5V, I _D = 10mA
Diode Forward Voltage	V _{SD}	—	0.6	1.0	V	V _{GS} = 0V, I _S = 150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	31	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	3.6	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	2.6	—	pF	
Gate Resistance	R _G	—	113	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q _g	—	0.41	—	nC	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 250mA
Gate-Source Charge	Q _{gs}	—	0.06	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.05	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	4.5	—	ns	V _{DD} = 15V, V _{GS} = 4.5V, R _G = 2Ω, I _D = 200mA
Turn-On Rise Time	t _R	—	3.4	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	24	—	ns	
Turn-Off Fall Time	t _F	—	12	—	ns	

- Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
 6. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
 7. Short duration pulse test used to minimize self-heating effect.
 8. Guaranteed by design. Not subject to product testing.

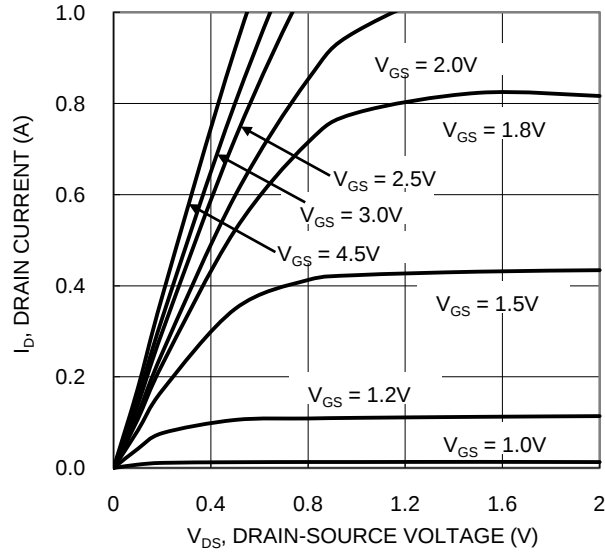


Figure 1. Typical Output Characteristic

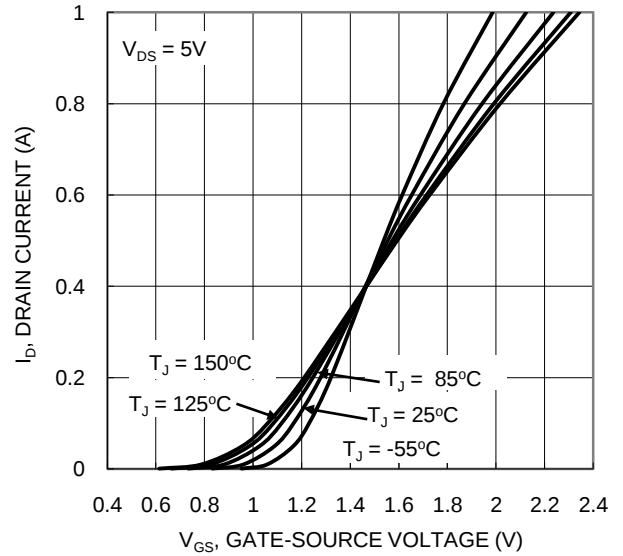


Figure 2. Typical Transfer Characteristic

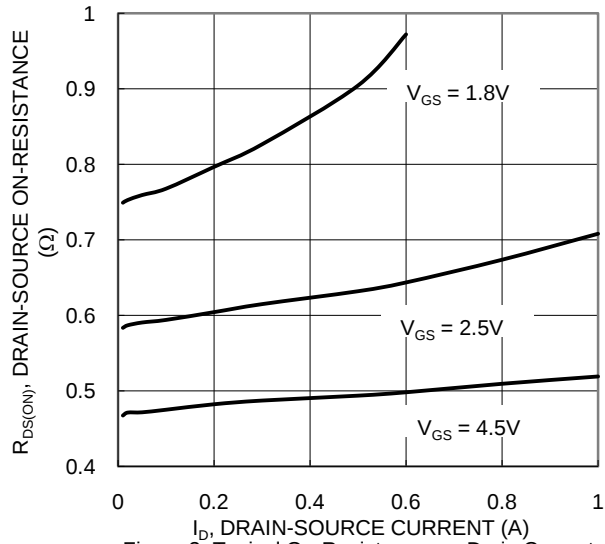


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

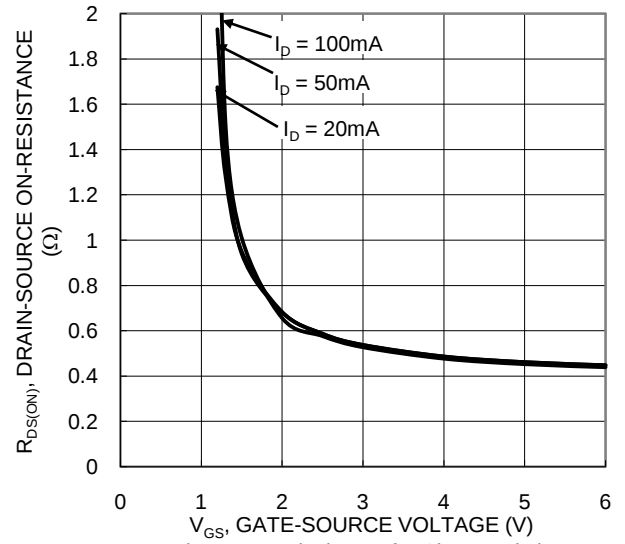


Figure 4. Typical Transfer Characteristic

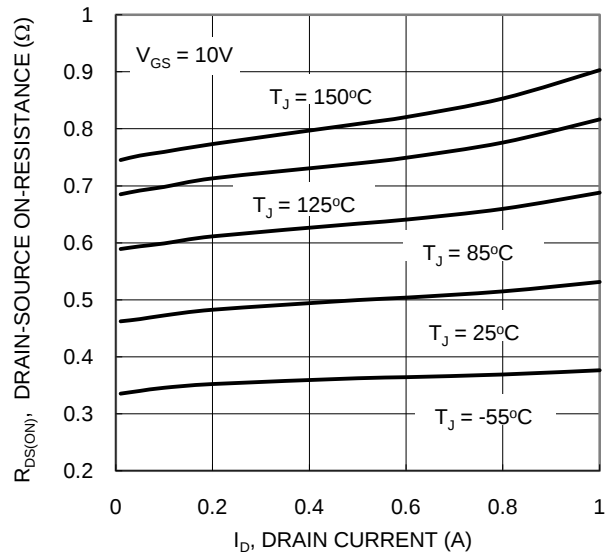


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

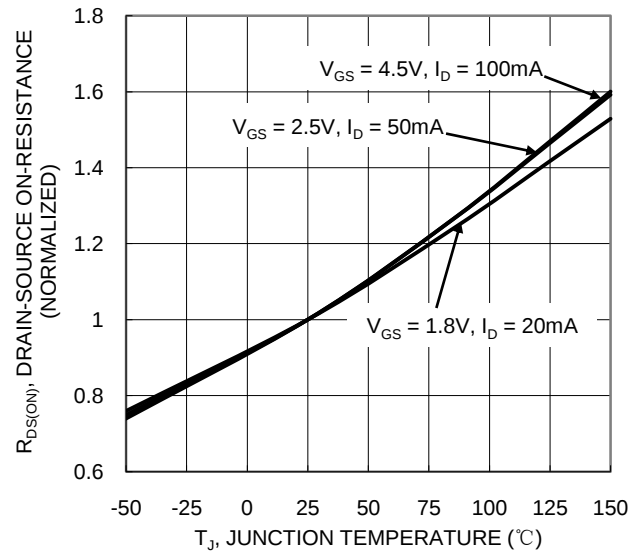
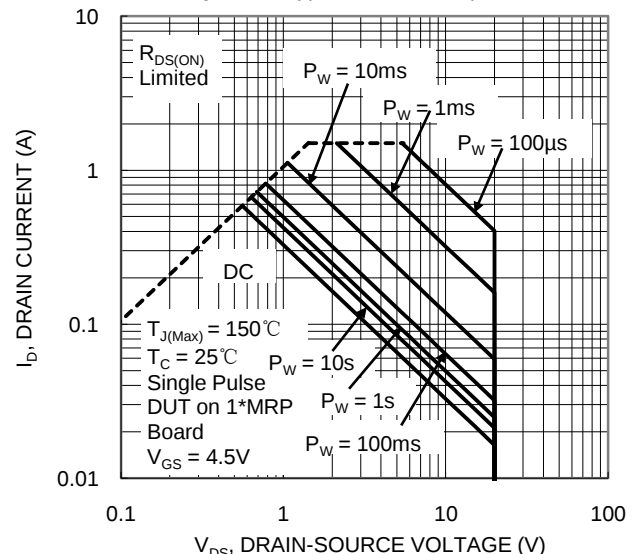
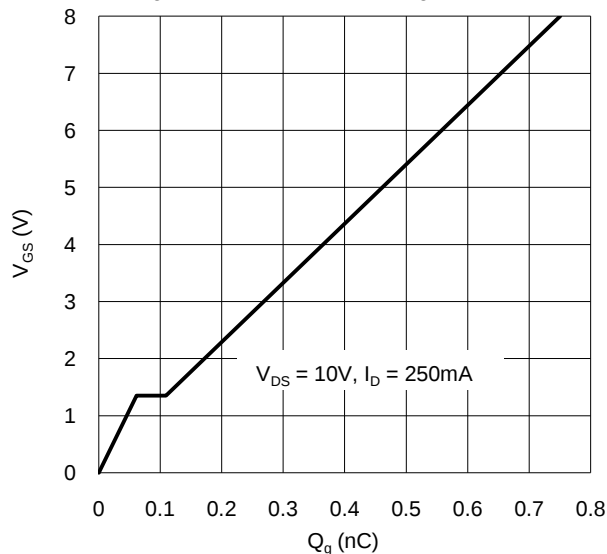
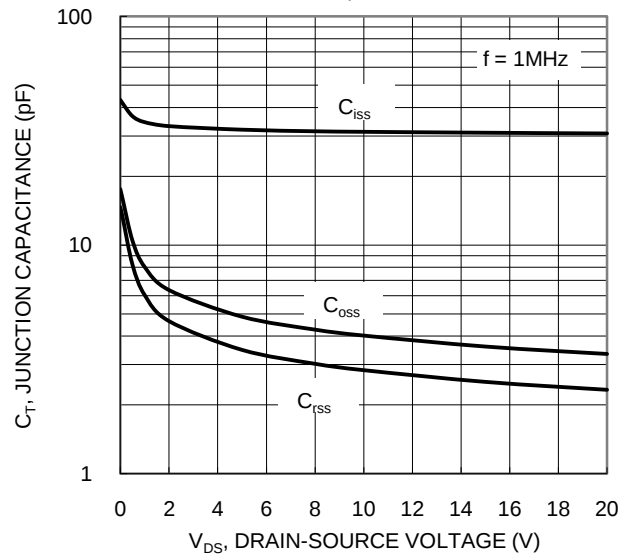
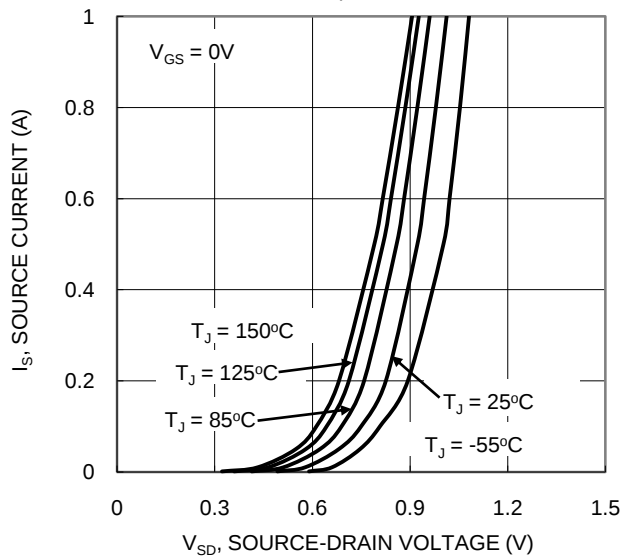
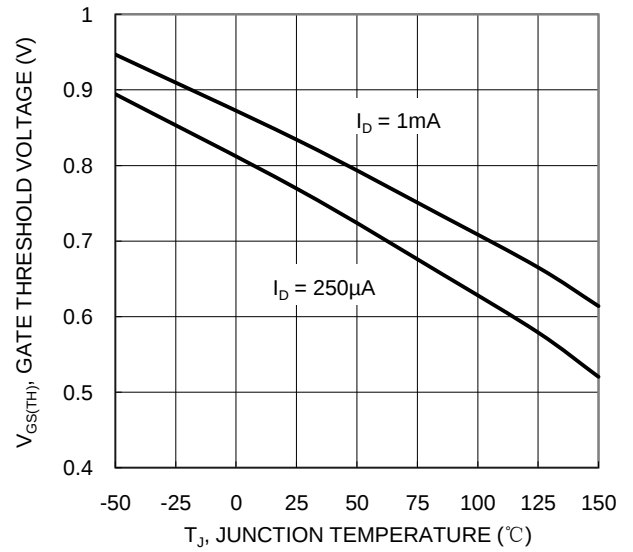
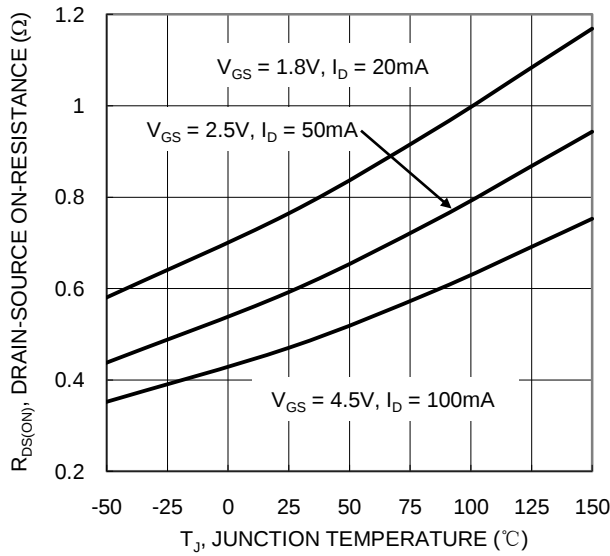


Figure 6. On-Resistance Variation with Junction Temperature



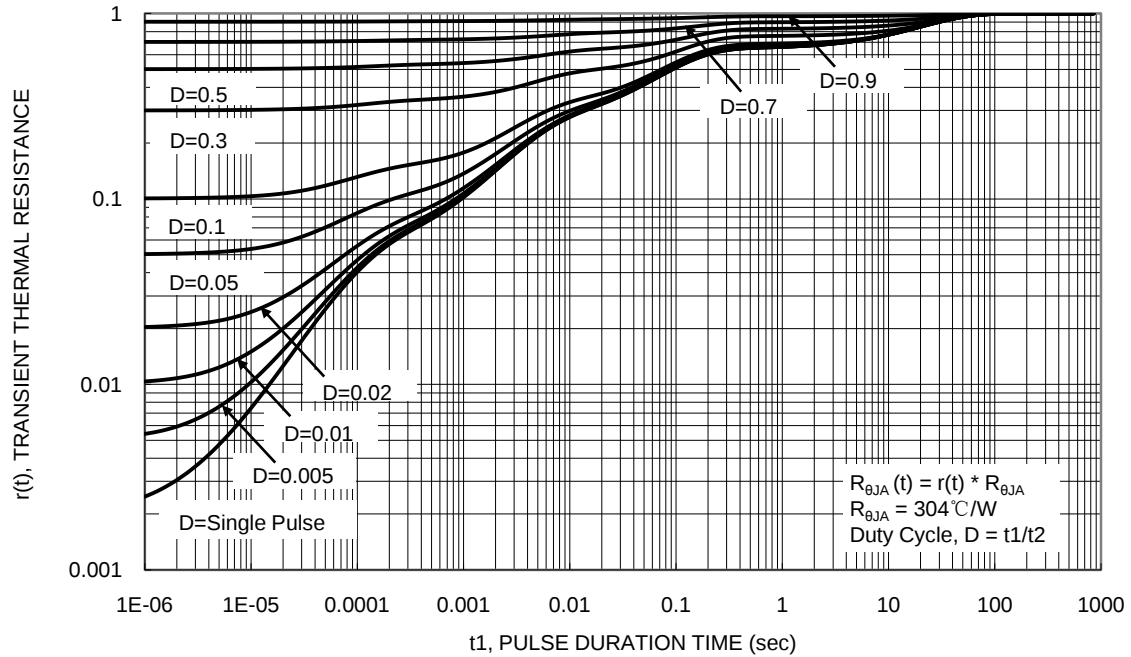
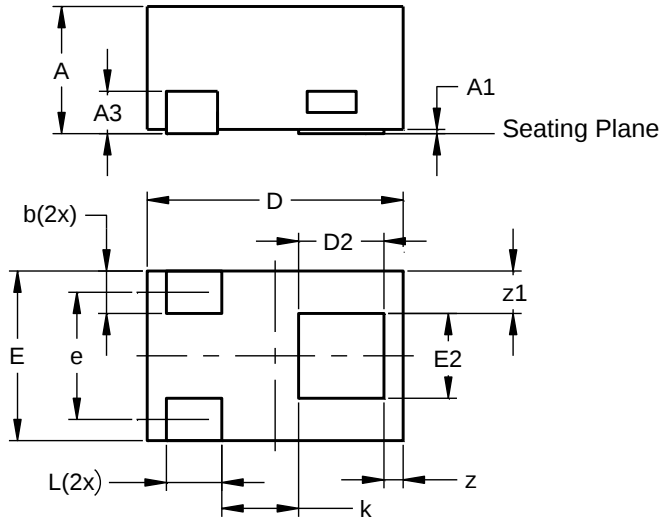


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DFN0604-3

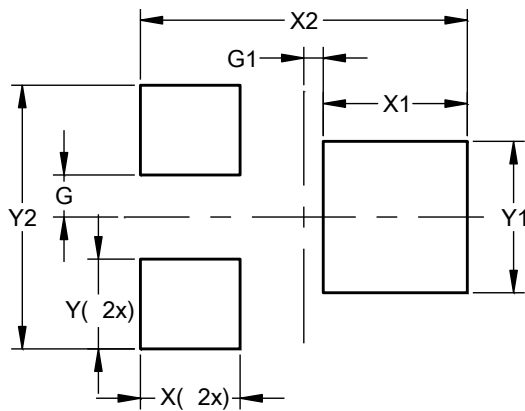


X2-DFN0604-3			
Dim	Min	Max	Typ
A	--	0.40	0.36
A1	0.00	0.03	0.02
A3	--	--	0.10
b	0.07	0.15	0.10
D	0.55	0.65	0.60
D2	0.15	0.25	0.20
E	0.35	0.45	0.40
E2	0.15	0.25	0.20
e	--	--	0.30
k	0.15	--	--
L	0.10	0.18	0.13
z	--	--	0.045
z1	--	--	0.10
All Dimensions in mm			

Suggested Pad Layout

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

X2-DFN0604-3



Dimensions	Value (in mm)
G	0.075
G1	0.035
X	0.180
X1	0.260
X2	0.590
Y	0.160
Y1	0.270
Y2	0.470

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