优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

企业微信二维码　　　企业QQ二维码

Product Summary

V(BR)DSS	RDS(ON) max	ID max TA = +25°C
20V	0.55Ω @ VGS = 4.5V	0.75A
	0.75Ω @ VGS = 2.5V	0.63A

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package

Description and Applications

This MOSFET is 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.

- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

Mechanical Data

- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: Collector Dot
- Terminals: Finish — NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.001 grams (Approximate)

X1-DFN1006-3

ESD PROTECTED TO 1.5kV
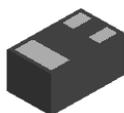
Bottom View
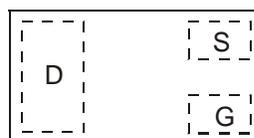
Top View
Package Pin Configuration
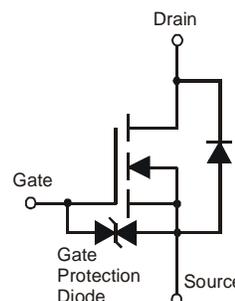
Equivalent Circuit

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C / T_A = +85°C	I_D	0.75 / 0.55	A
Continuous Drain Current (Note 5) V_{GS} = 2.5V	Steady State	T_A = +25°C / T_A = +85°C	I_D	0.63 / 0.45	A
Pulsed Drain Current (Note 6)			I_{DM}	3	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	0.47	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	258	°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 T_J = +25°C	I_{DSS}	-	-	100	nA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±1.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±50	µA	V_{GS} = ±10V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	0.9	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS (ON)}$	-	-	0.55	Ω	V_{GS} = 4.5V, I_D = 600mA
		-	-	0.75		V_{GS} = 2.5V, I_D = 500mA
		-	-	0.9		V_{GS} = 1.8V, I_D = 350mA
Forward Transfer Admittance	$|Y_{fs}|$	-	1.0	-	S	V_{DS} = 10V, I_D = 400mA
Diode Forward Voltage (Note 7)	V_{SD}		0.7	1.2	V	V_{GS} = 0V, I_S = 150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	36.0	-	pF	V_{DS} = 16V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	5.7	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	4.2	-	pF	
Total Gate Charge	Q_g	-	0.5	-	nC	V_{GS} =4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	-	0.07	-	nC	
Gate-Drain Charge	Q_{gd}	-	0.1	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	4.11	-	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47Ω, R_G = 10Ω, I_D = 200mA
Turn-On Rise Time	t_r	-	3.82	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	14.8	-	ns	
Turn-Off Fall Time	t_f	-	9.6	-	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.
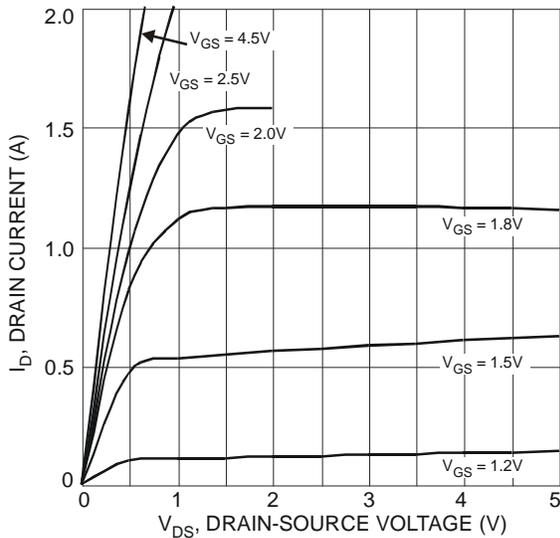8. Guaranteed by design. Not subject to product testing.
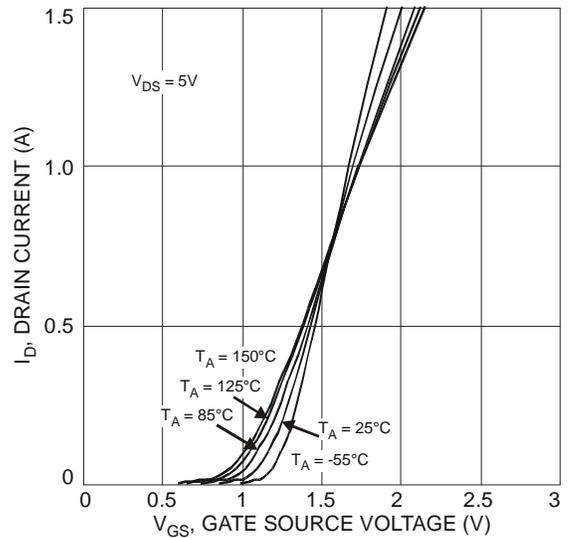
Fig. 1 Typical Output Characteristics

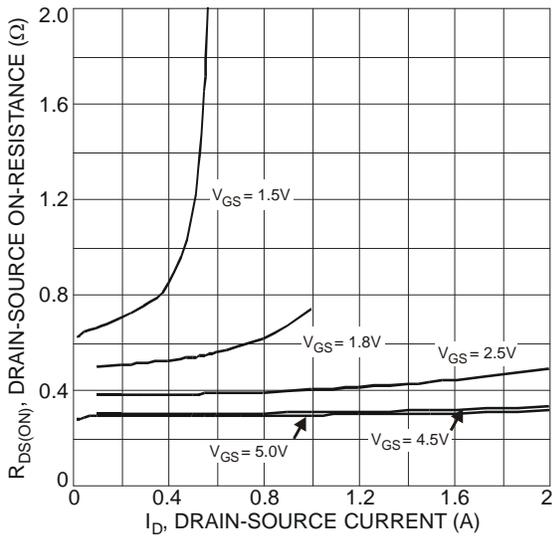Fig. 2 Typical Transfer Characteristics

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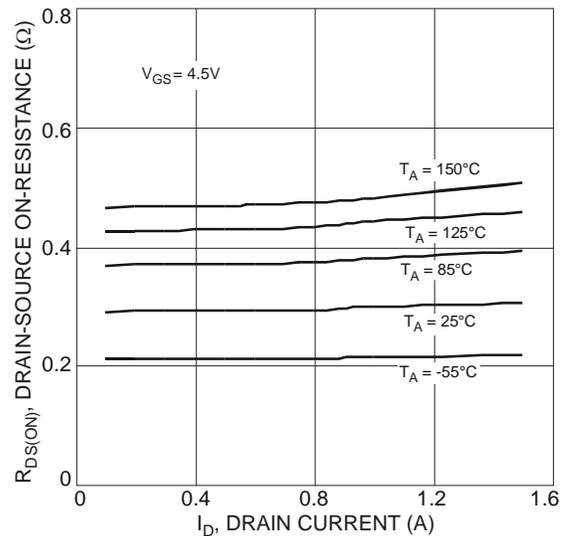vs. Drain Current and Gate Voltage

Fig. 4 Typical Drain-Source On-Resistance
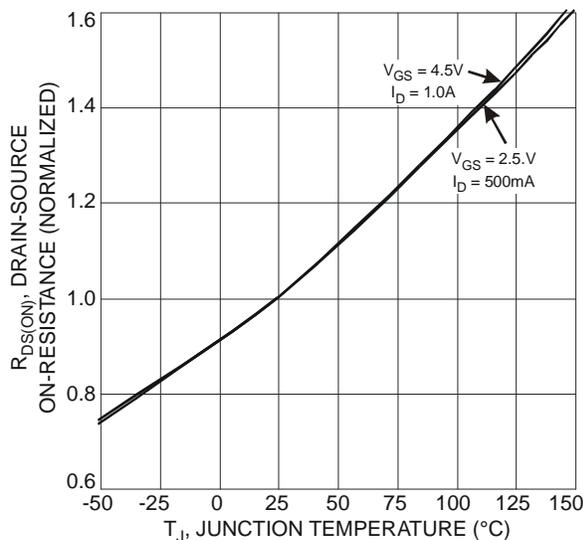vs. Drain Current and Temperature

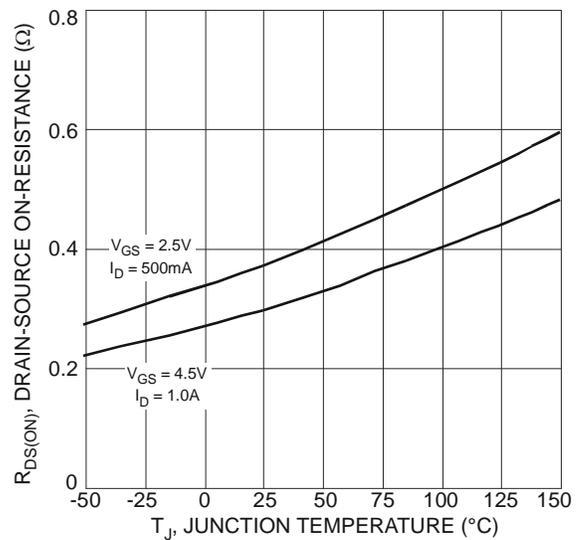Fig. 5 On-Resistance Variation with Temperature
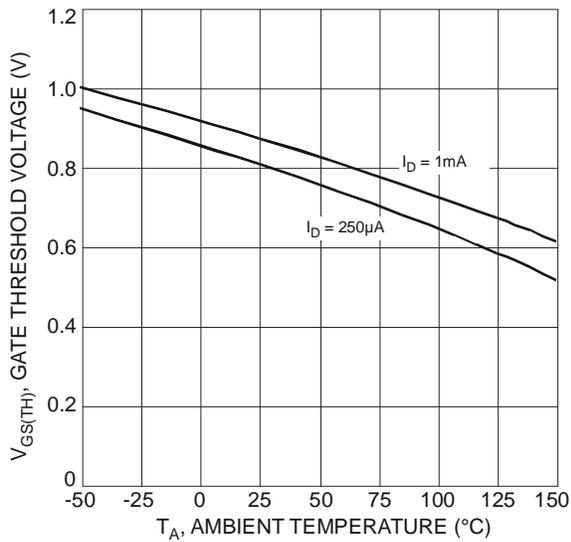

Fig. 6 On-Resistance Variation with Temperature

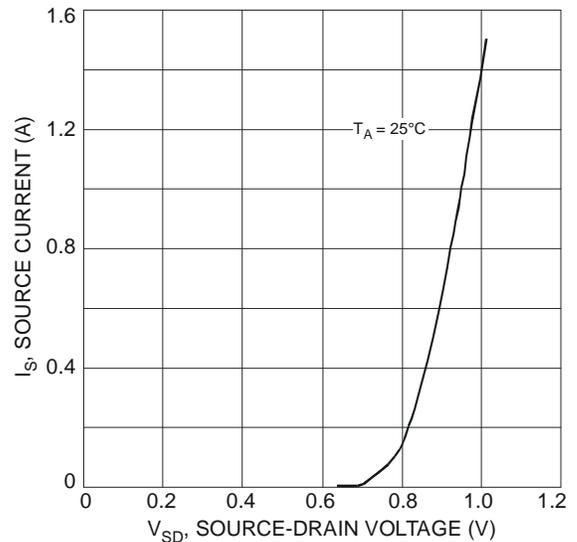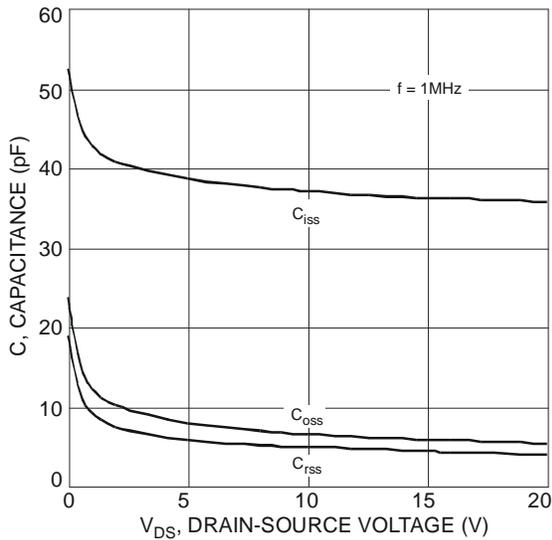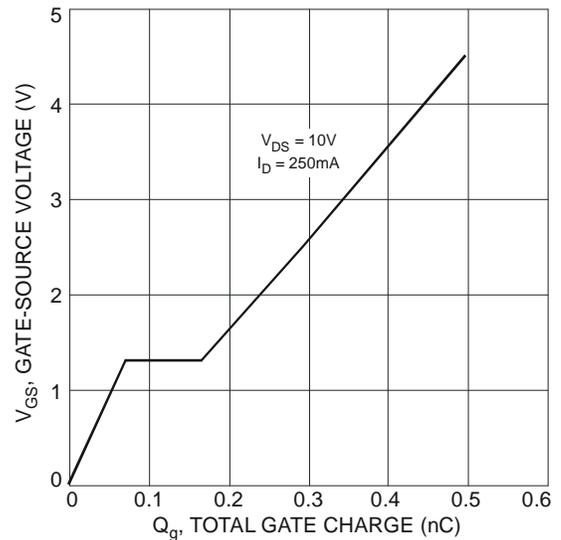Fig. 7 Gate Threshold Variation vs. Ambient Temperature

Fig. 8 Diode Forward Voltage vs. Current

Fig. 9 Typical Capacitance

Fig. 10 Gate-Charge Characteristics

$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$
$$R_{\theta JA} = 253°C/W$$

$$T_J - T_A = P * R_{\theta JA}(t)$$
$$\text{Duty Cycle, } D = t_1/t_2$$
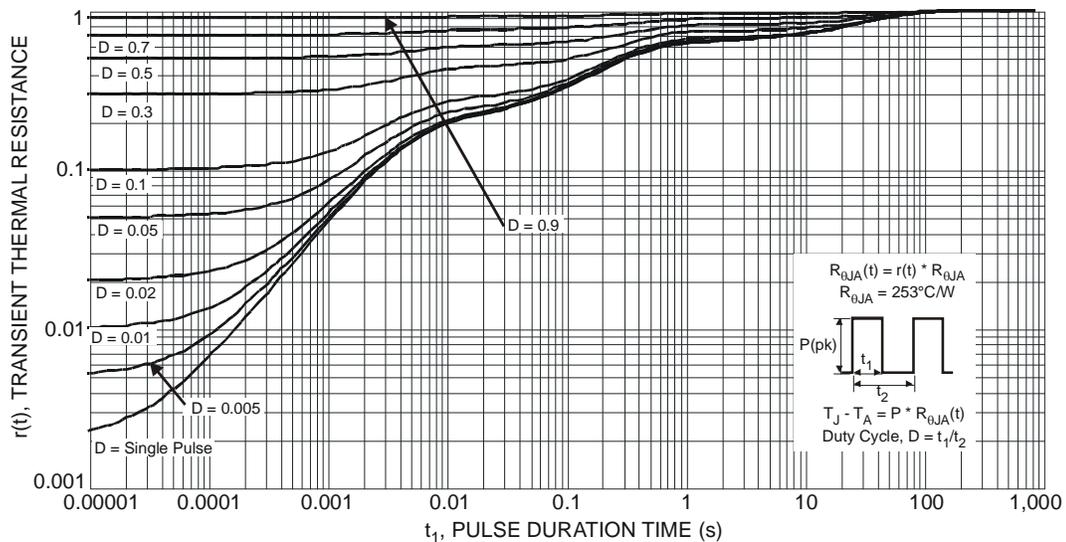
Fig. 11 Transient Thermal Response

Package Outline Dimensions
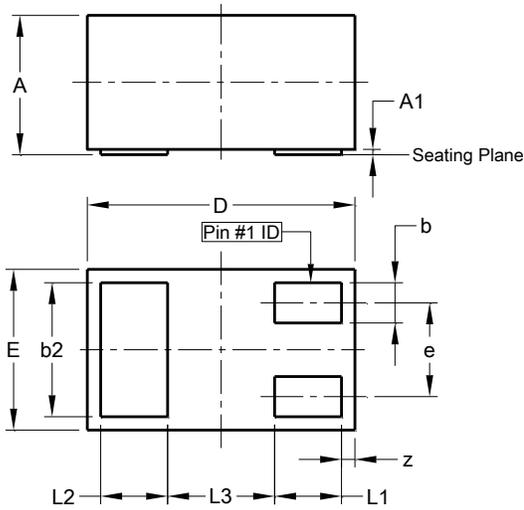
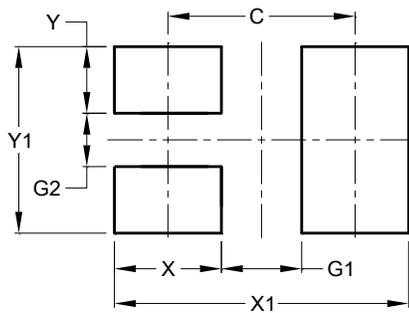| X1-DFN1006-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70