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

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Product Summary

BV_{DSS}	$R_{DS(ON)\ Max}$	$I_{D\ Max}$ T_A = +25°C
-40V	33mΩ @ V_{GS} = -10V	-6A
	50mΩ @ V_{GS} = -4.5V	-4.9A

Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm^2
- Low Gate Threshold Voltage
- Low On-Resistance

Description and Applications

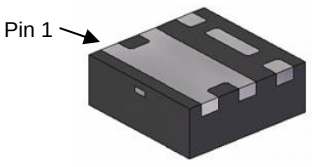
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- General-purpose interfacing switches
- Load switching
- Battery-management applications
- Power-management functions

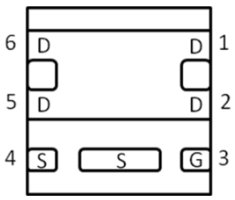
Mechanical Data

- Package: U-DFN2020-6
- Package 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 e4
- Weight: 0.0065 grams (Approximate)

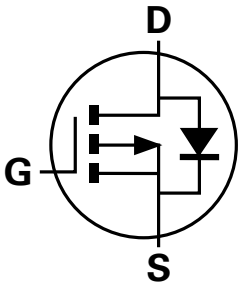
U-DFN2020-6 (Type E)



Bottom View



Pinout
Bottom View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 5) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.3 -2.6	A
	t < 5s	T_A = +25°C T_A = +70°C	I_D	-5.3 -4.2	A
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-6.0 -4.8	A
	t < 5s	T_A = +25°C T_A = +70°C	I_D	-9.5 -7.6	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-40	A
Maximum Body Diode Continuous Current			I_S	-3	A

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.7	W
	T_A = +70°C		0.42	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	180	°C/W
	t < 5s		76	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.1	W
	T_A = +70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	58	°C/W
	t < 5s		25	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	10.2	
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}	-40	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	-2.2	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	26	33	mΩ	V_{GS} = -10V, I_D = -4.4A
			36	50		V_{GS} = -4.5V, I_D = -3.7A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	5.2	—	S	V_{DS} = -15V, I_D = -4.4A
Diode Forward Voltage	V_{SD}	—	-0.75	-1.2	V	V_{GS} = 0V, I_S = -3.9A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1382	—	pF	V_{DS} = -20V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	103	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	81	—	pF	
Gate Resistance	R_g	—	7.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	11.2	—	nC	V_{DS} = -20V, I_D = -4.9A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	23.2	—	nC	
Gate-Source Charge	Q_{gs}	—	3.3	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	18.4	—	ns	V_{DS} = -20V, I_D = -3.9A V_{GS} = -4.5V, R_g = 1Ω
Turn-On Rise Time	t_R	—	28.2	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	38.8	—	ns	
Turn-Off Fall Time	t_F	—	28.6	—	ns	
Reverse-Recovery Time	t_{RR}	—	15.4	—	ns	I_F = -3.9A, di/dt = 100A/µs
Reverse-Recovery Charge	Q_{RR}	—	5.4	—	nC	

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

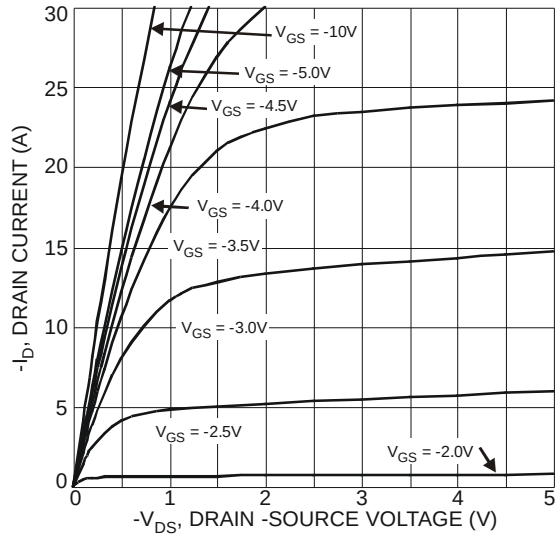


Fig. 1 Typical Output Characteristics

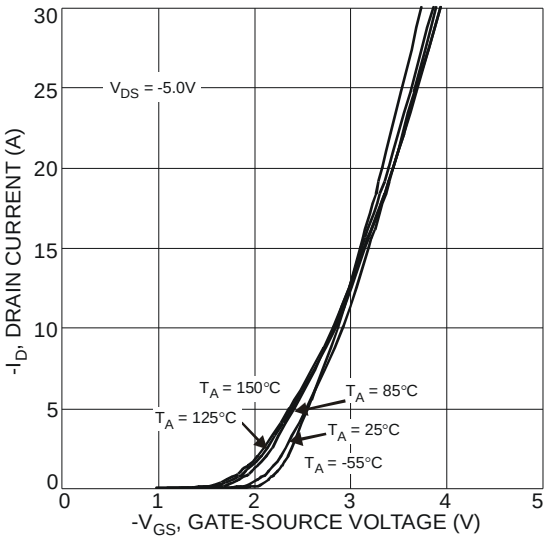


Fig. 2 Typical Transfer Characteristics

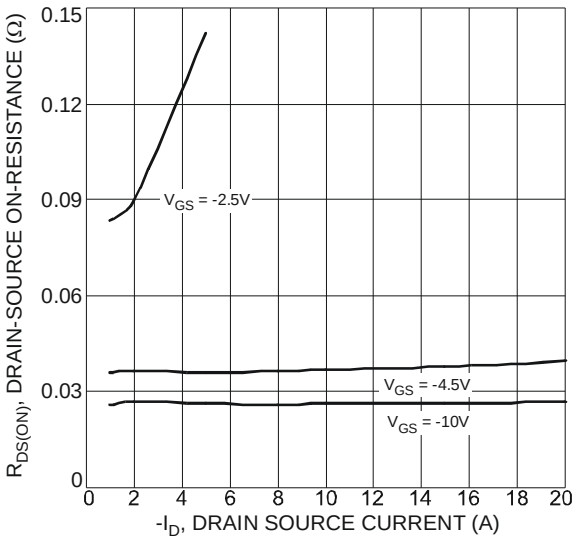


Fig. 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

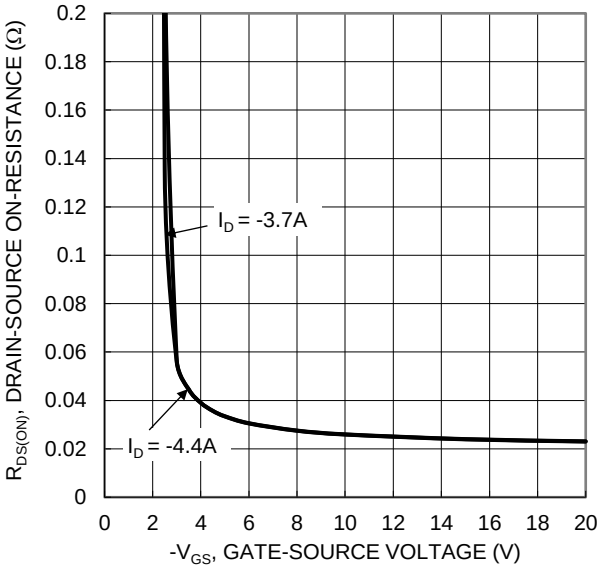


Fig. 4 Typical On-Resistance vs Gate Voltage

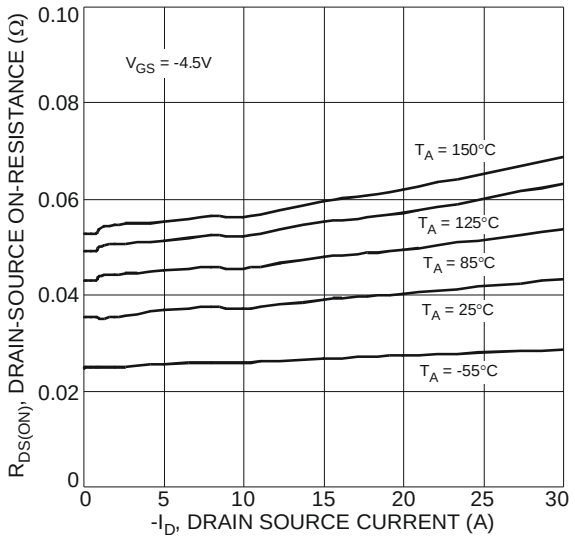


Fig. 5 Typical On-Resistance vs.
Drain Current and Temperature

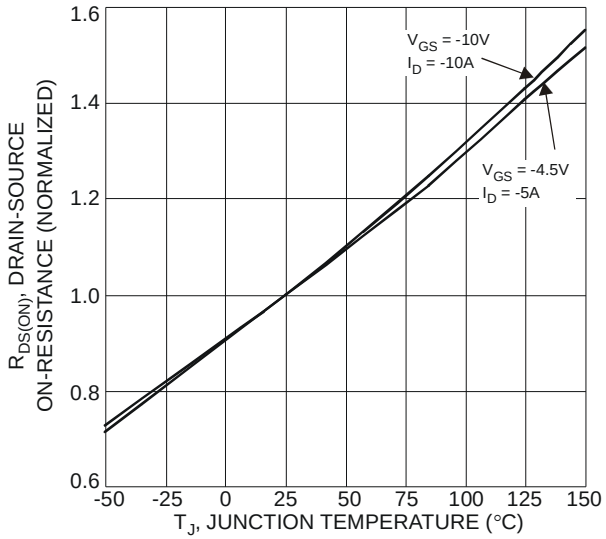


Fig. 6 On-Resistance Variation with Temperature

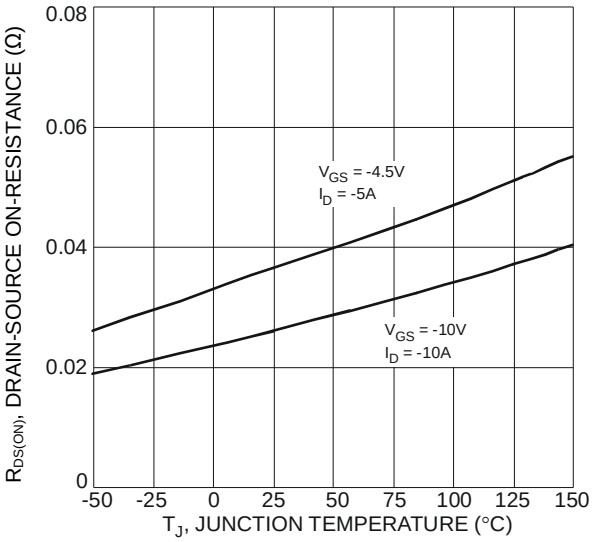


Fig. 7 On-Resistance Variation with Temperature

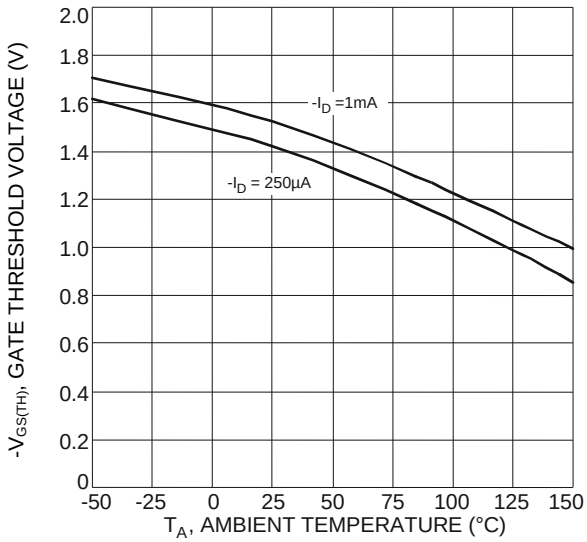


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

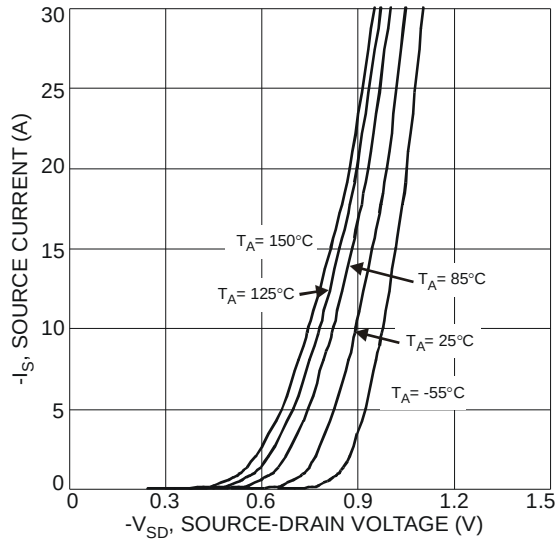


Fig. 9 Diode Forward Voltage vs. Current

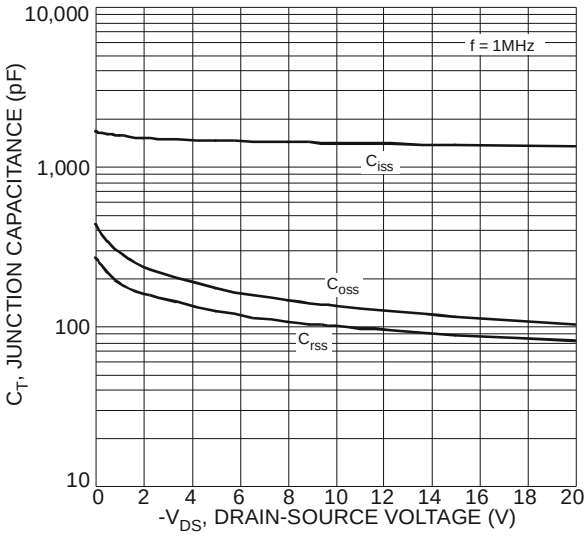


Fig. 10 Typical Junction Capacitance

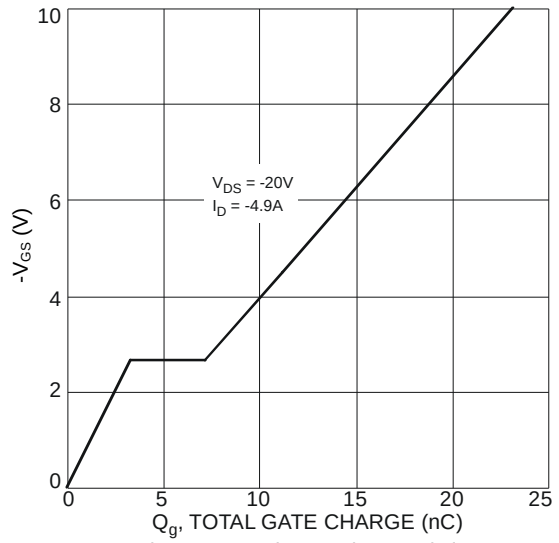


Fig. 11 Gate-Charge Characteristics

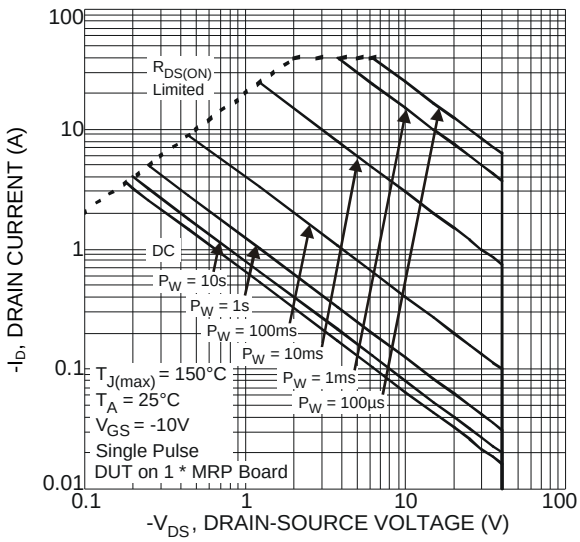


Fig. 12 SOA, Safe Operation Area

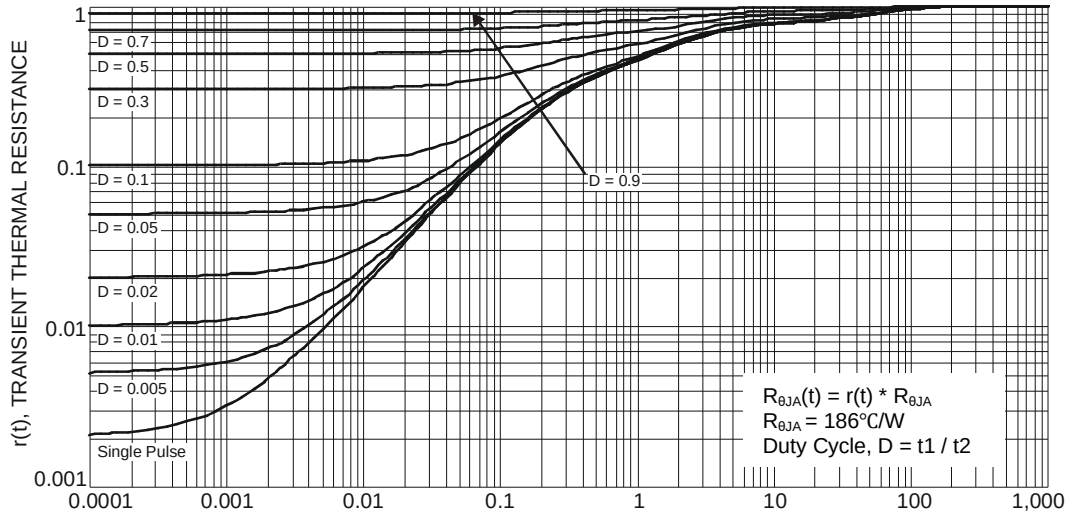
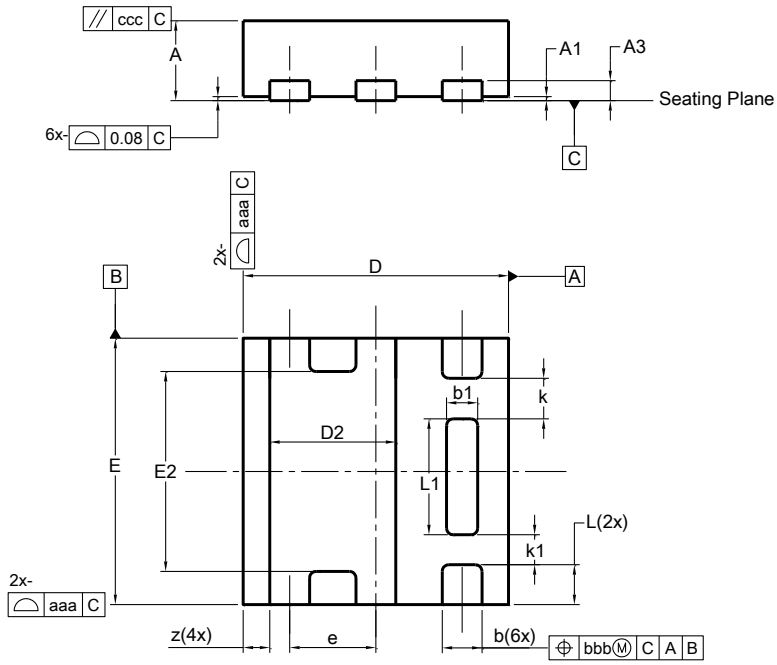


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

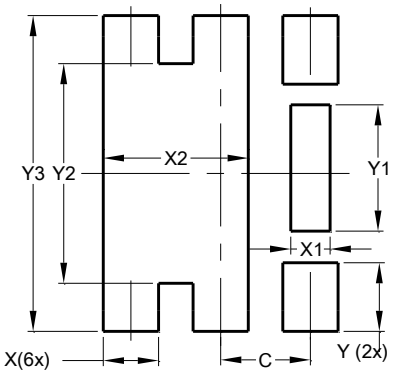
U-DFN2020-6 (Type E)



U-DFN2020-6 (Type E)			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	–	–	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	–	–	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
k	–	–	0.305
k1	–	–	0.225
Z	–	–	0.20
All Dimensions in mm			

Suggested Pad Layout

U-DFN2020-6 (Type E)



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.285
X2	1.050
Y	0.500
Y1	0.920
Y2	1.600
Y3	2.300