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

0755-83047638
ysbdt@szyoushang.cn
www.szyoushang.cn

企业微信二维码

企业QQ二维码

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
30V	30mΩ @ V_{GS} = 10V	5.5A
	42mΩ @ V_{GS} = 4.5V	4.7A

Features and Benefits

- 100% Unclamped Inductive Switching—Ensures More Reliable and Robust Application
- Low On-Resistance—Minimizes Power Losses
- Low Gate Charge—Minimizes Switching Losses
- Small Form Factor Low-Profile Package—Increased Power Density
- Sidewall Plated for Improved Optical Inspection

Description and Applications

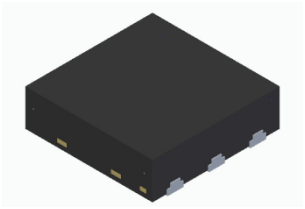
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and ideal for use in:

- Body Control Electronics
- Power Management Functions
- DC-DC Converters

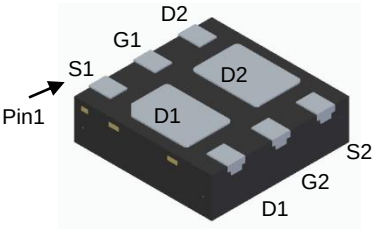
Mechanical Data

- Case: U-DFN2020-6
- 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 e3
- Terminals Connections: See Diagram Below
- Weight: 0.007 grams (Approximate)

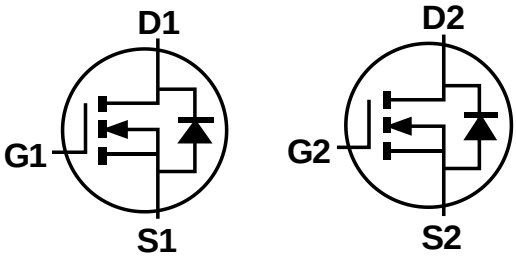
U-DFN2020-6 (SWP) (Type B)



Top View



Bottom View



Internal Schematic

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +75°C	I_D	5.5 4.4	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	1.7	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	30	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	12	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	7.7	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	0.82	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\Theta JA}$	153	°C/W
Total Power Dissipation (Note 6)		P_D	1.37	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\Theta JA}$	91	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\Theta JC}$	30	
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 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	µA	V_{DS} = 30V, V_{GS} = 0V
Zero Gate Voltage Drain Current T_J = +150°C (Note 9)	I_{DSS}	—	—	100	µA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	24	30	mΩ	V_{GS} = 10V, I_D = 5.8A
			30	42		V_{GS} = 4.5V, I_D = 4.8A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	500	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	52	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	44	—	pF	
Gate Resistance	R_g	—	2.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.0	—	nC	V_{DS} = 15V, I_D = 5.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	10.6	—	nC	
Gate-Source Charge	Q_{gs}	—	1.3	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.2	—	ns	V_{DD} = 15V, V_{GS} = 10V, R_L = 2.6Ω, R_G = 3Ω
Turn-On Rise Time	t_R	—	2.6	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.7	—	ns	
Turn-Off Fall Time	t_F	—	2.0	—	ns	

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

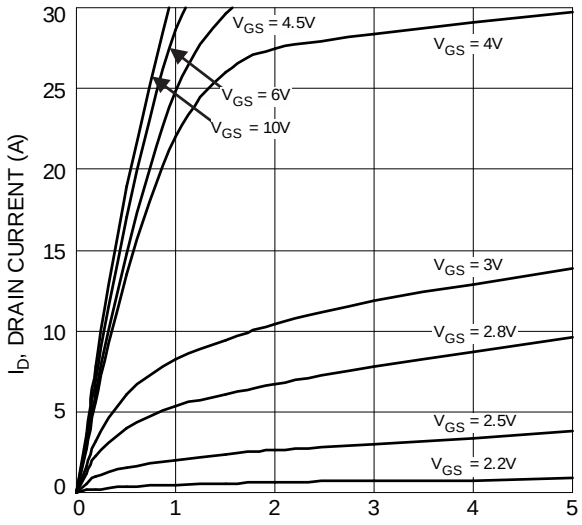


Figure 1 Typical Output Characteristic

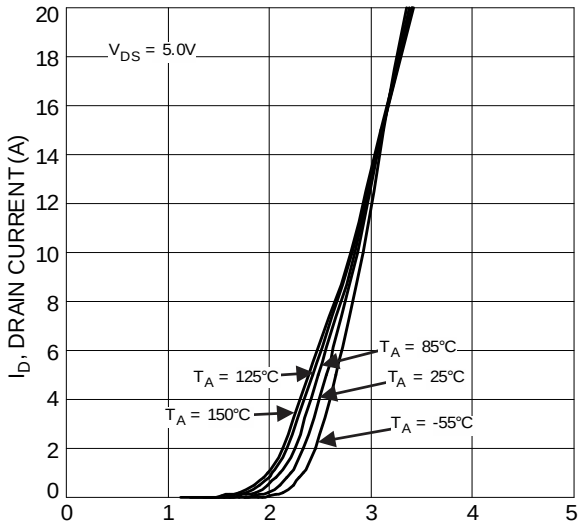


Figure 2 Typical Transfer Characteristics

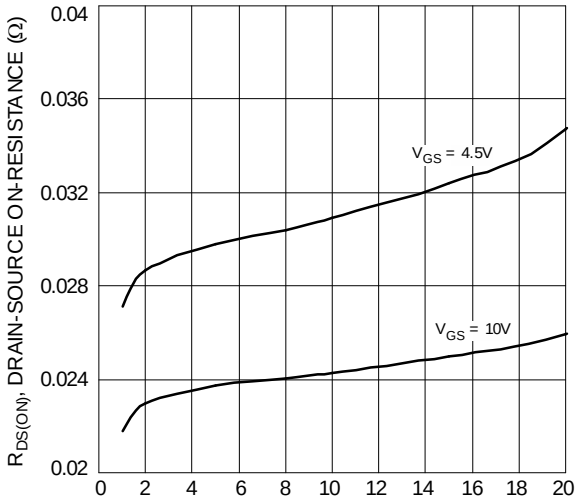


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

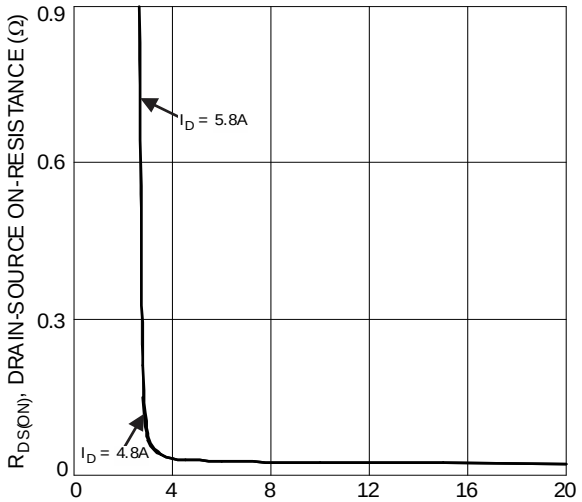


Figure 4 Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

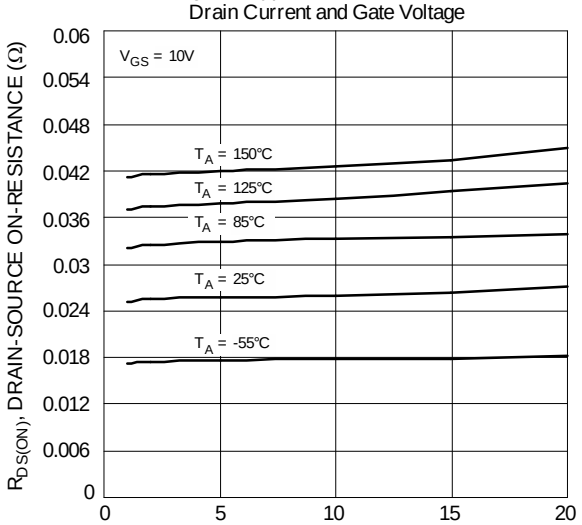


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

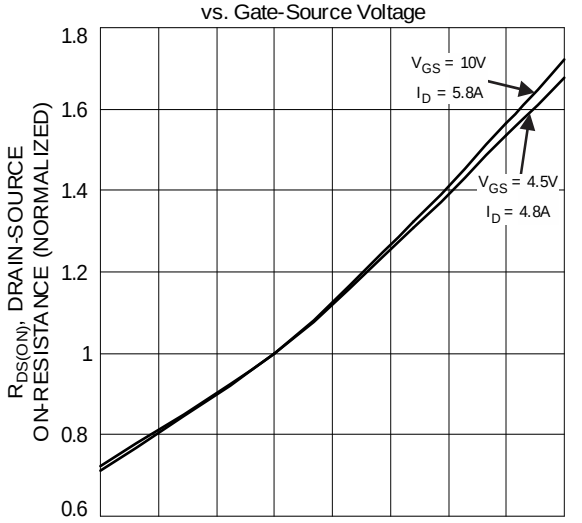


Figure 6 On-Resistance Variation with Temperature

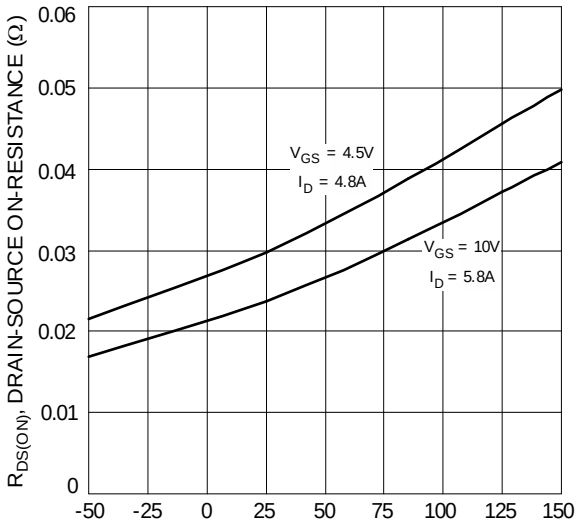


Figure 7 On-Resistance Variation with Temperature

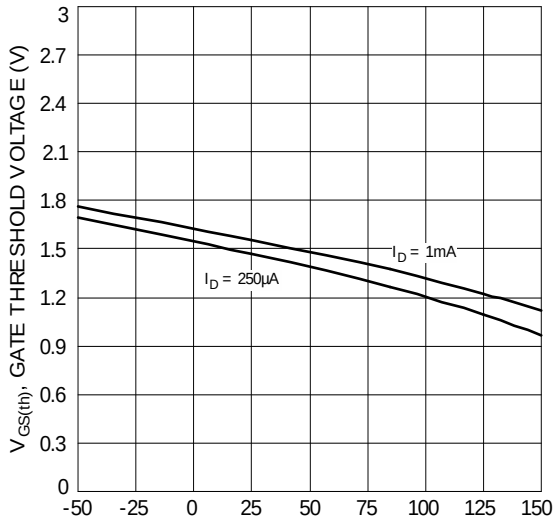


Figure 8 Gate Threshold Variation vs. Junction Temperature

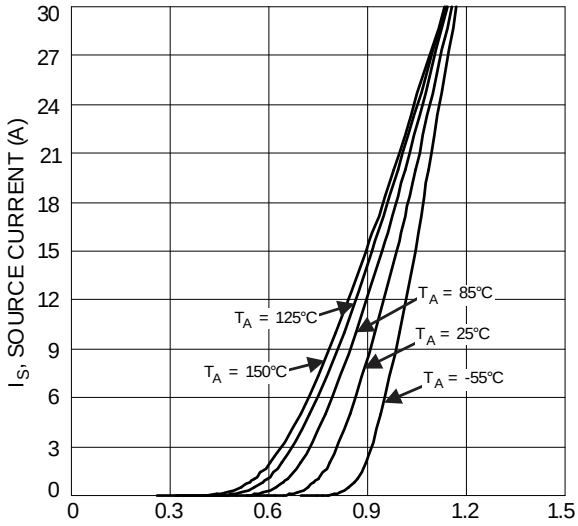


Figure 9 Diode Forward Voltage vs. Current

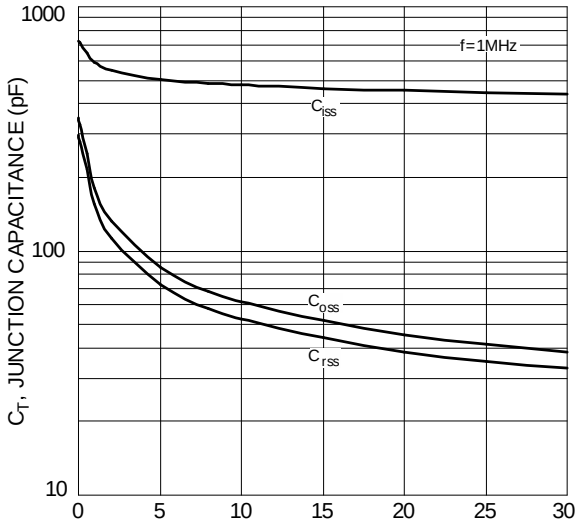


Figure 10 Typical Junction Capacitance

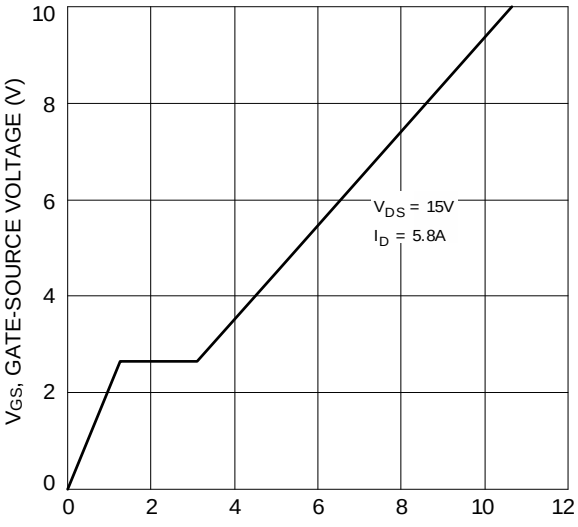


Figure 11 Gate Charge

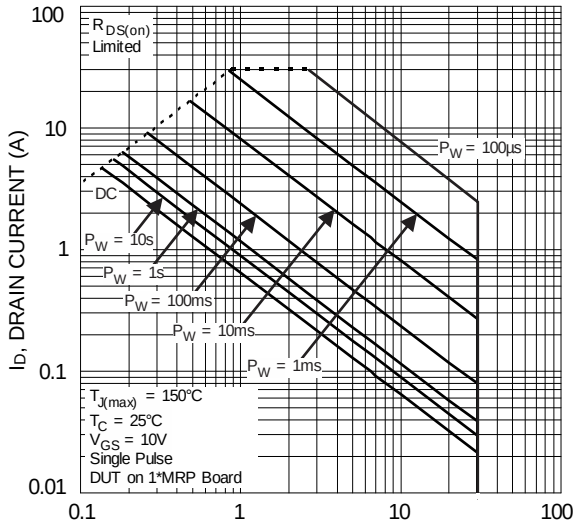


Figure 12 SOA, Safe Operation Area

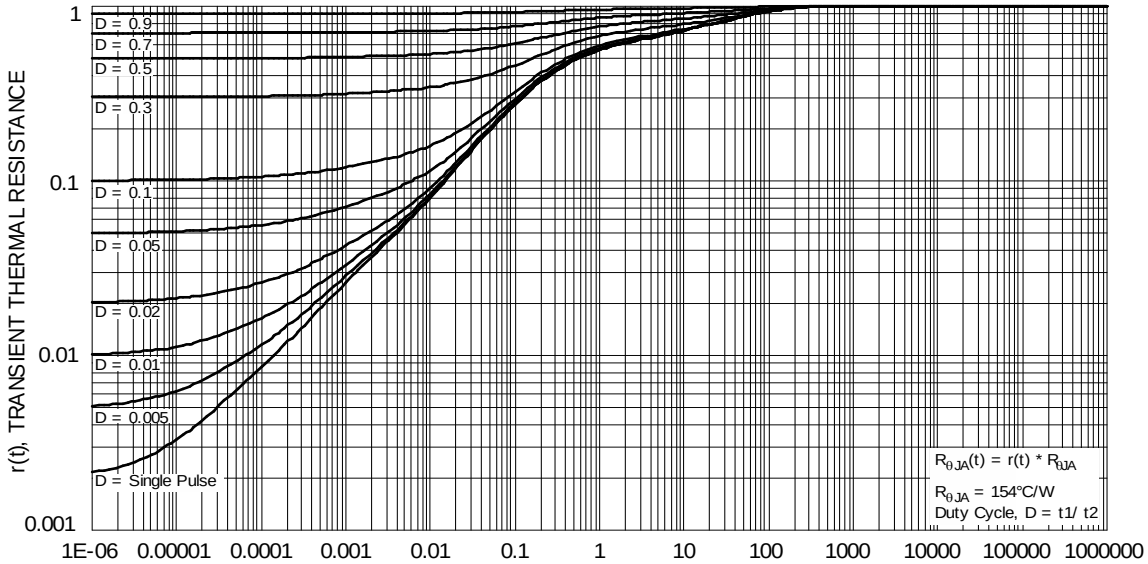
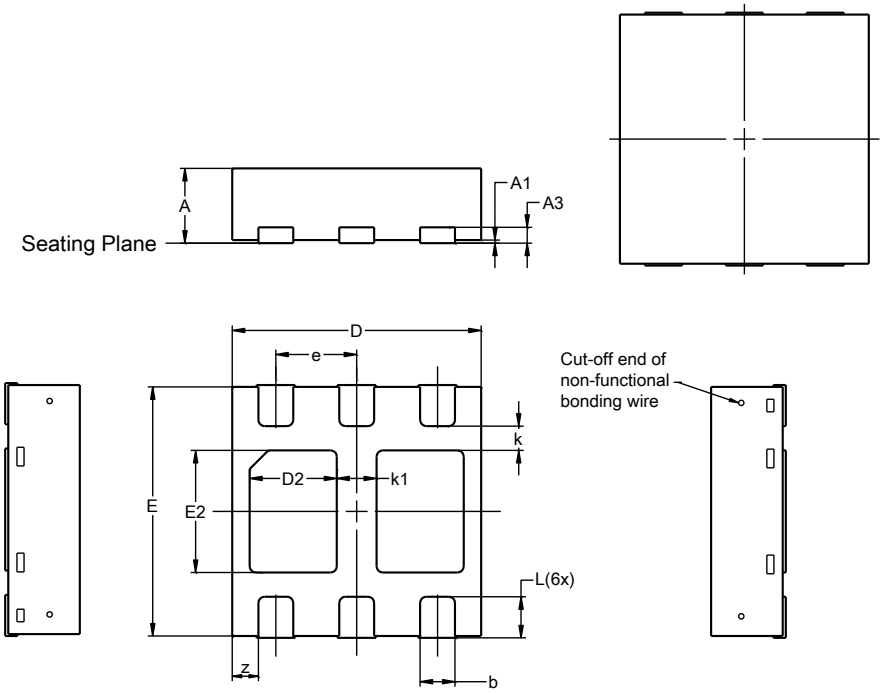


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

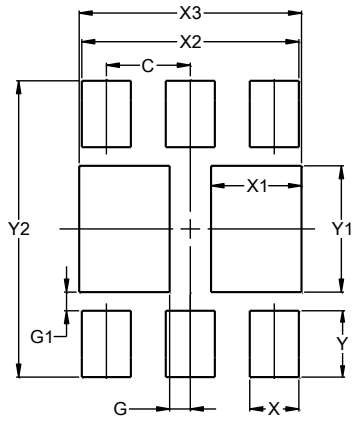
U-DFN2020-6 (SWP) (Type B)



U-DFN2020-6 (SWP) (Type B)			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.65	0.60
A1	0.00	0.05	0.03
A3	--	--	0.127
b	0.23	0.33	0.28
D	1.95	2.05	2.00
D2	0.60	0.80	0.70
E	1.95	2.05	2.00
E2	0.88	1.08	0.98
e	0.65BSC		
k	0.195BSC		
k1	0.32BSC		
L	0.28	0.38	0.33
z	0.21BSC		
All Dimensions in mm			

Suggested Pad Layout

U-DFN2020-6 (SWP) (Type B)



Dimensions	Value (in mm)
C	0.650
G	0.160
G1	0.145
X	0.380
X1	0.700
X2	1.680
X3	1.720
Y	0.515
Y1	0.980
Y2	2.300