



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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企业微信二维码



企业QQ二维码

Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1 N-Channel	30V	30mΩ @ V _{GS} = 10V	5.3A
		42mΩ @ V _{GS} = 4.5V	4.5A
Q2 P-Channel	-30V	70mΩ @ V _{GS} = -10V	-3.4A
		100mΩ @ V _{GS} = -4.5V	-2.9A

Description and Applications

This 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.

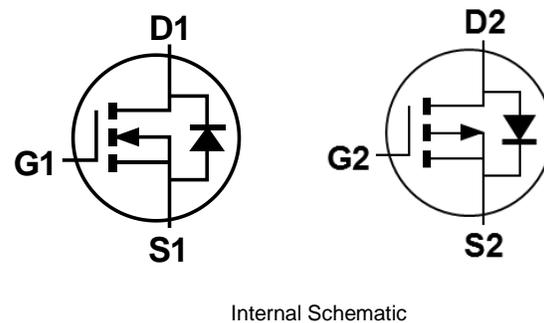
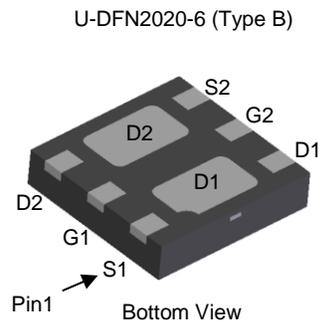
- Body control electronics
- Power management functions
- DC-DC converters

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

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 Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)



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

Characteristic			Symbol	Q1 N-CHANNEL	Q2 P-CHANNEL	Unit
Drain-Source Voltage			V _{DSS}	30	-30	V
Gate-Source Voltage			V _{GSS}	±20	±20	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _A = +25°C	I _D	5.3	-3.4	A
		T _A = +75°C		4.2	-2.7	
Maximum Continuous Body Diode Forward Current (Note 5)			I _S	1.6	-1.2	A
Pulsed Body Diode Forward Current (370μs Pulse, Duty Cycle = 1%)			I _{SM}	20	-20	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	20	-20	A
Avalanche Current (Note 6) L = 0.1mH			I _{AS}	12	-14	A
Avalanche Energy (Note 6) L = 0.1mH			E _{AS}	10	10	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 7)		P _D	0.8	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	149	°C/W
Total Power Dissipation (Note 5)		P _D	1.28	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	98	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Electrical Characteristics Q1 N-CHANNEL (@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
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	
Turn-On Rise Time	t _r	—	2.6	—	ns	V _{DD} = 15V, V _{GS} = 10V R _L = 2.6Ω, R _G = 3Ω
Turn-Off Delay Time	t _{D(OFF)}	—	9.7	—	ns	
Turn-Off Fall Time	t _f	—	2.0	—	ns	

Electrical Characteristics Q2 P-CHANNEL (@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
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	—	-2.1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	53	70	mΩ	V _{GS} = -10V, I _D = -3.8A
		—	75	100		V _{GS} = -4.5V, I _D = -3.0A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -2.7A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	336	—	pF	V _{DS} = -25V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	70	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	49	—	pF	
Gate Resistance	R _g	—	4.6	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	4.0	—	nC	V _{DS} = -15V, I _D = -3.8A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	7.8	—	nC	
Gate-Source Charge	Q _{gs}	—	1.0	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.5	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	6.0	—	ns	
Turn-On Rise Time	t _r	—	5.0	—	ns	V _{DD} = -15V, V _{GS} = -10V I _D = -1A, R _G = 6Ω
Turn-Off Delay Time	t _{D(OFF)}	—	17.6	—	ns	
Turn-Off Fall Time	t _f	—	9.5	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

Q1 N-CHANNEL

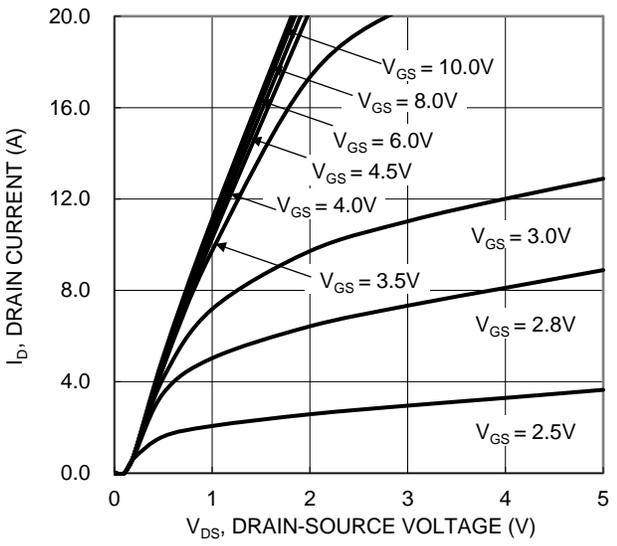


Figure 1. Typical Output Characteristic

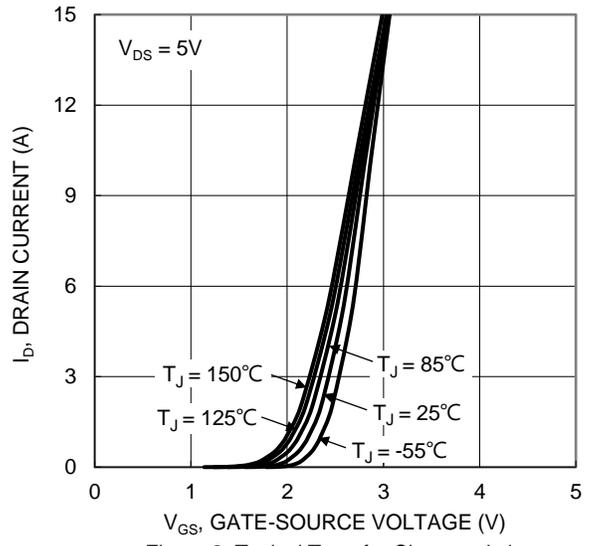


Figure 2. Typical Transfer Characteristic

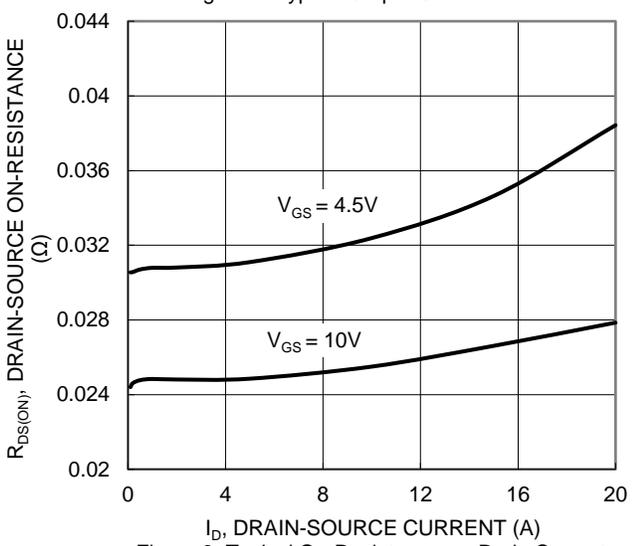


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

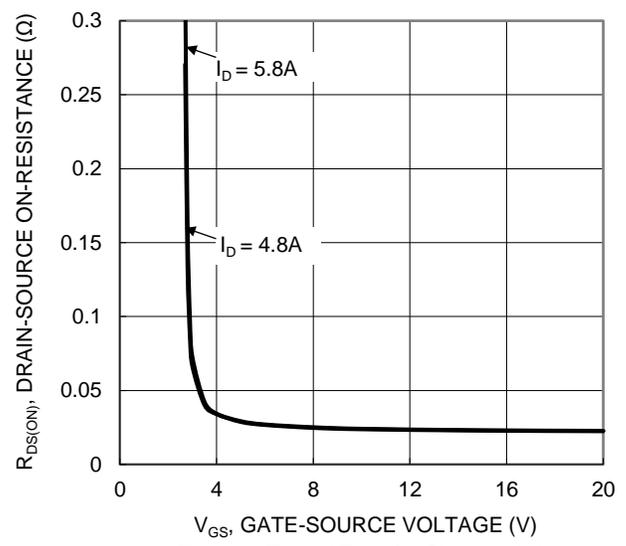


Figure 4. Typical Transfer Characteristic

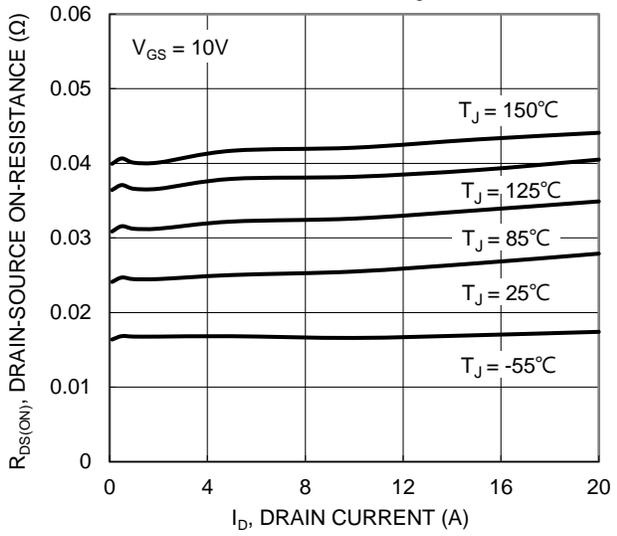


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

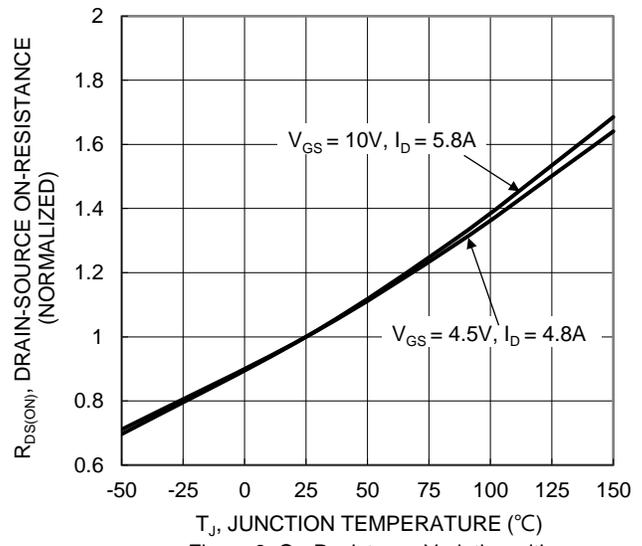


Figure 6. On-Resistance Variation with Junction Temperature

Q1 N-CHANNEL (continued)

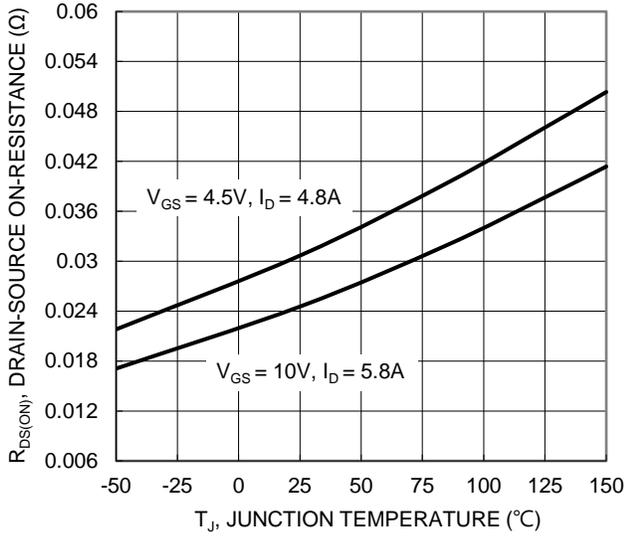


Figure 7. On-Resistance Variation with Temperature

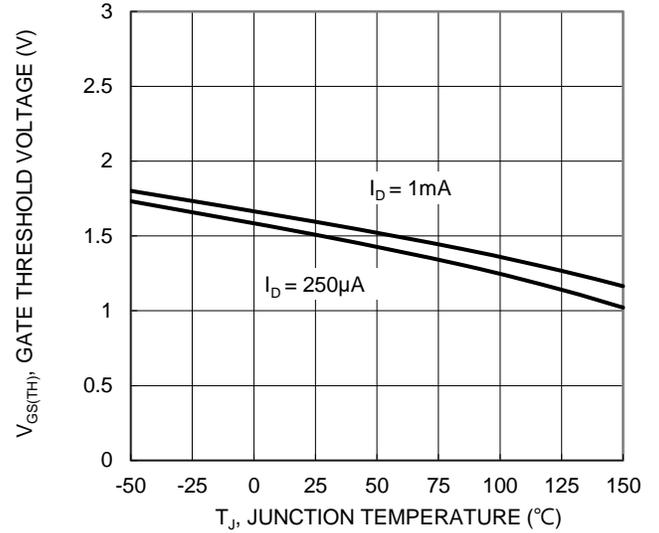


Figure 8. Gate Threshold Variation vs. Temperature

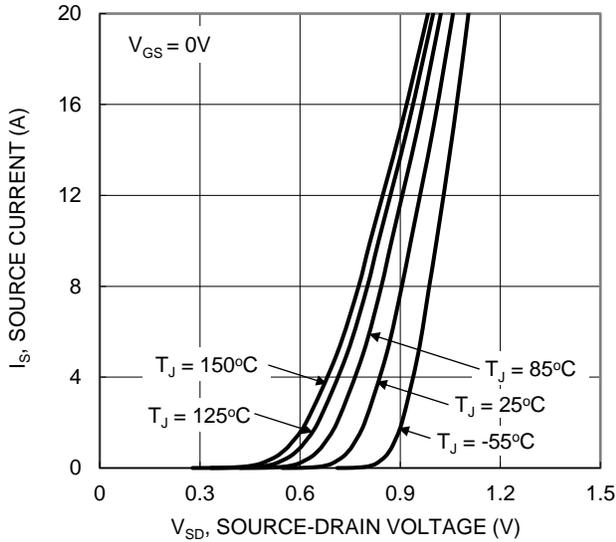


Figure 9. Diode Forward Voltage vs. Current

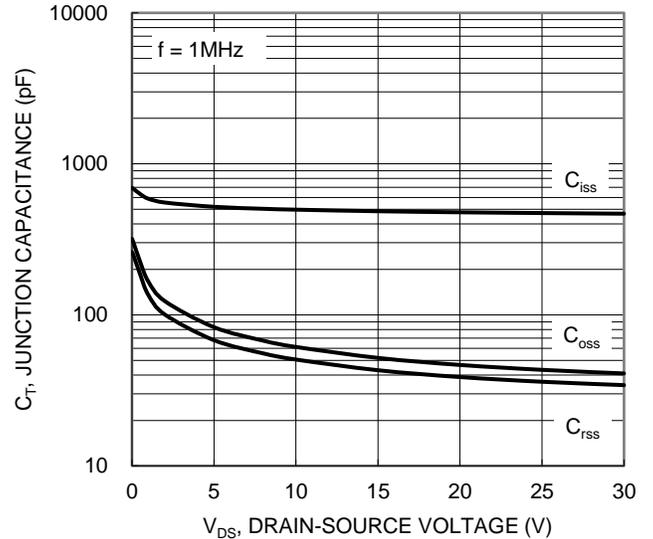


Figure 10. Typical Junction Capacitance

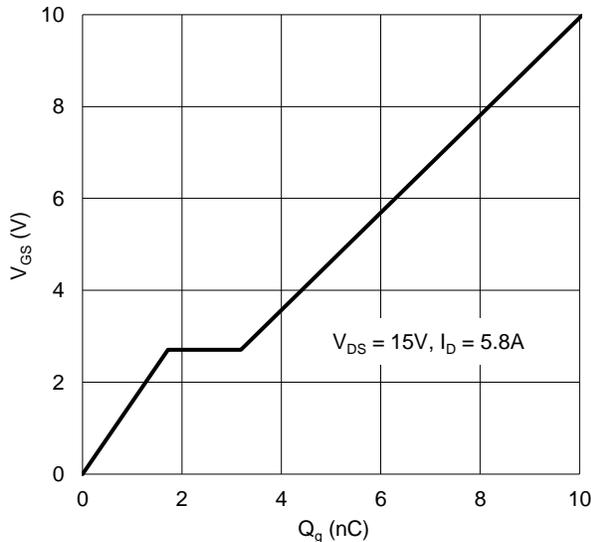


Figure 11. Gate Charge

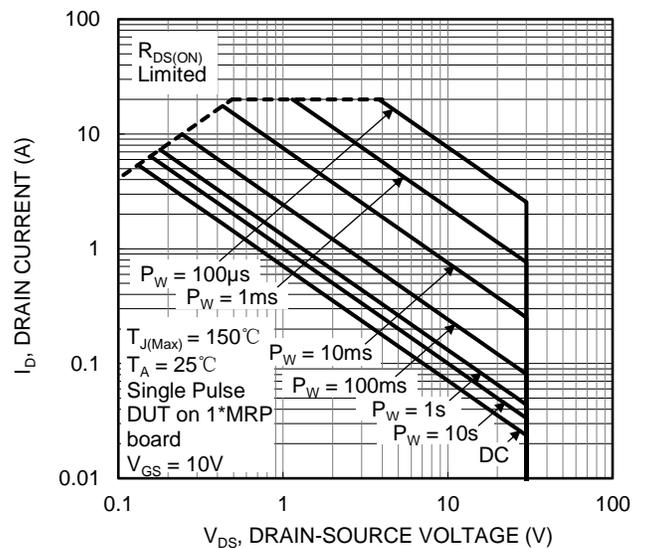


Figure 12. SOA, Safe Operation Area

Q1 N-CHANNEL (continued)

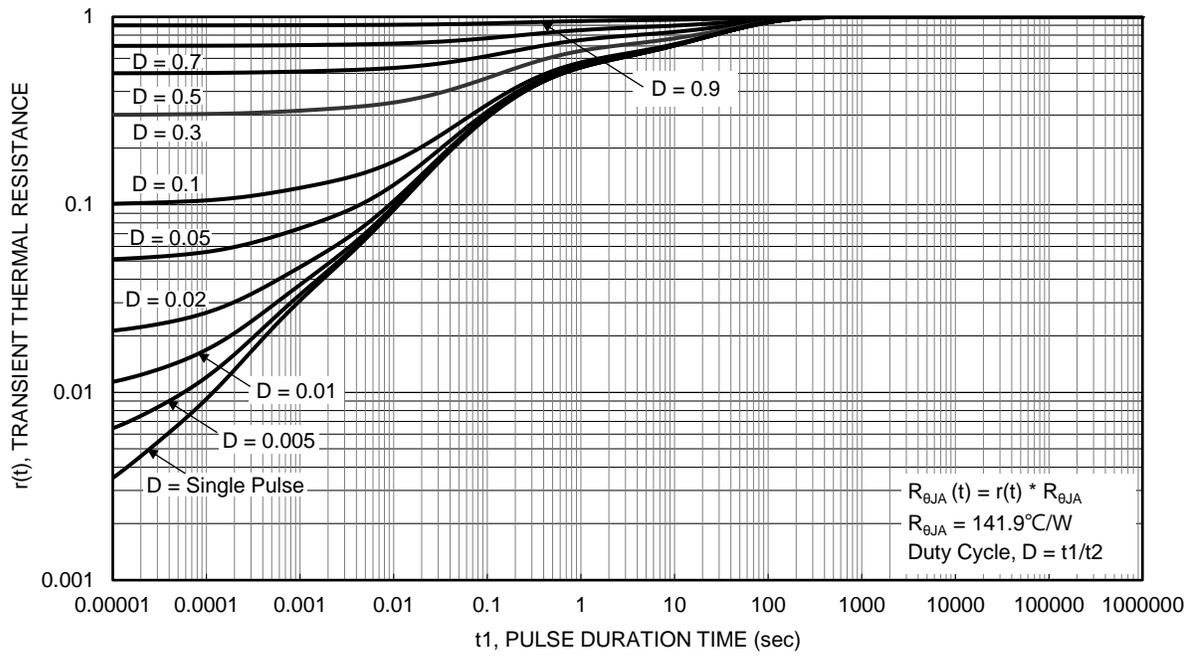


Figure 13. Transient Thermal Resistance

Q2 P-CHANNEL

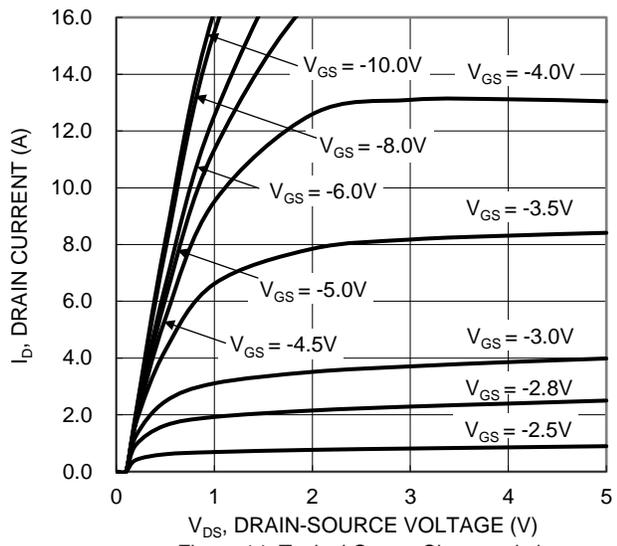


Figure 14. Typical Output Characteristic

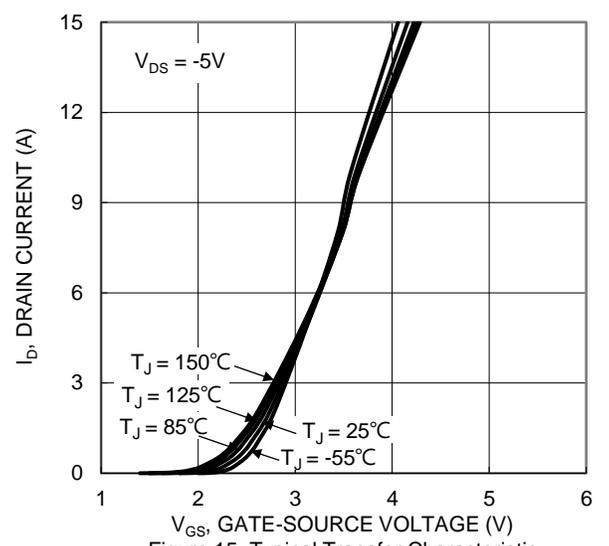


Figure 15. Typical Transfer Characteristic

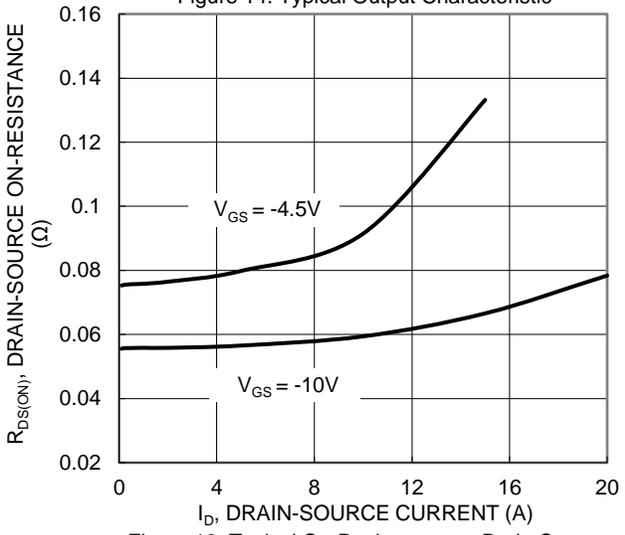


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

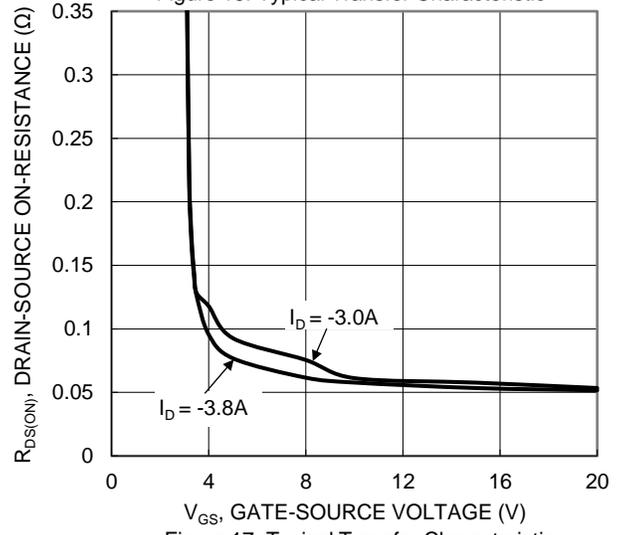


Figure 17. Typical Transfer Characteristic

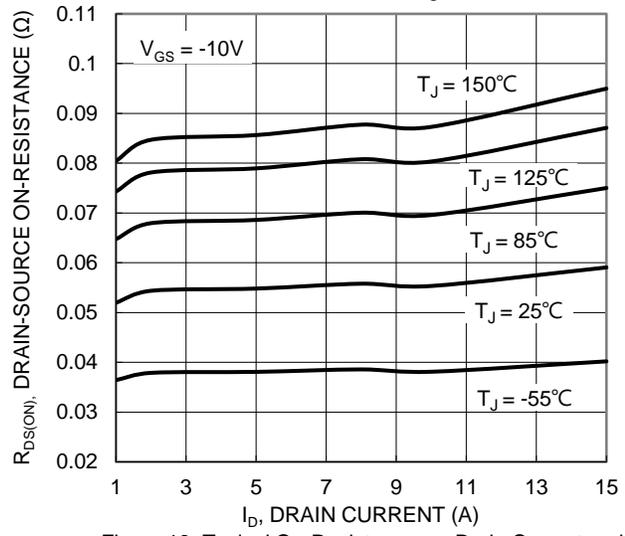


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

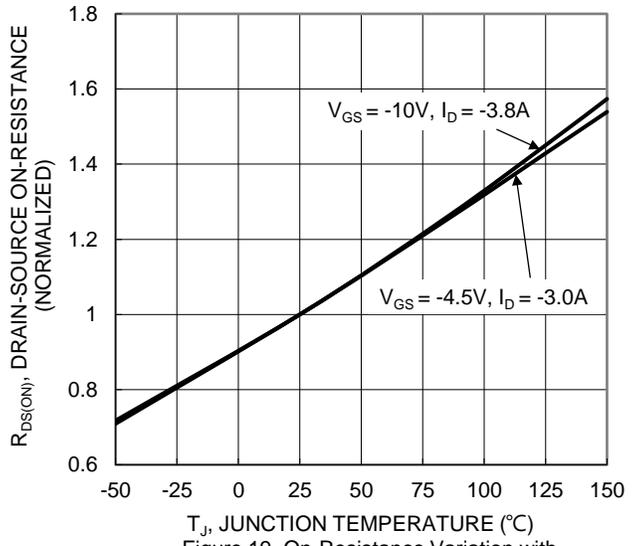


Figure 19. On-Resistance Variation with Junction Temperature

Q2 P-CHANNEL (continued)

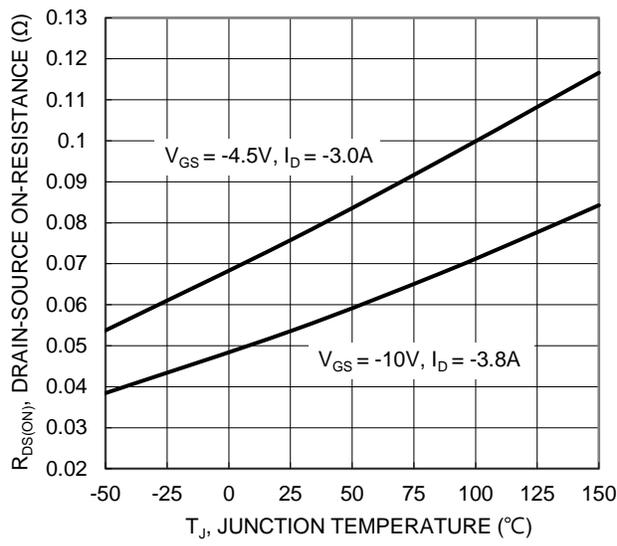


Figure 20. On-Resistance Variation with Temperature

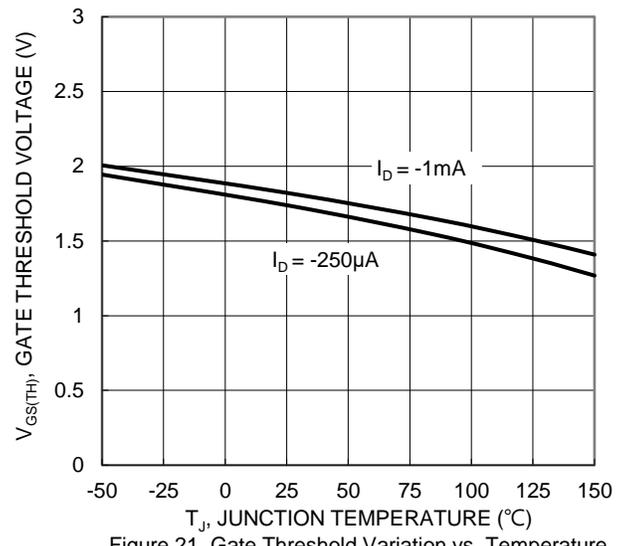


Figure 21. Gate Threshold Variation vs. Temperature

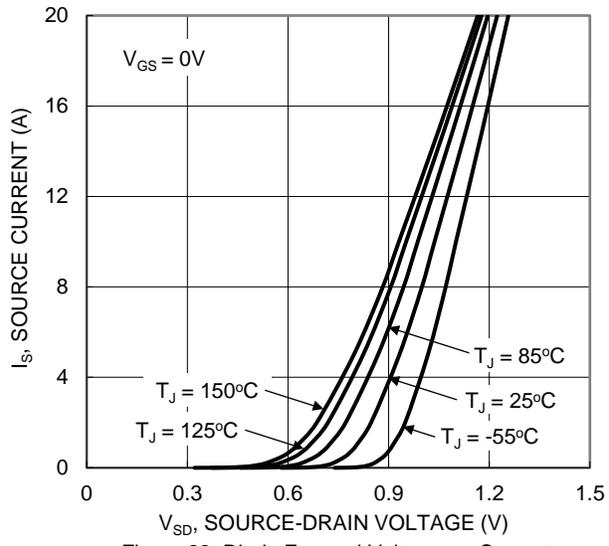


Figure 22. Diode Forward Voltage vs. Current

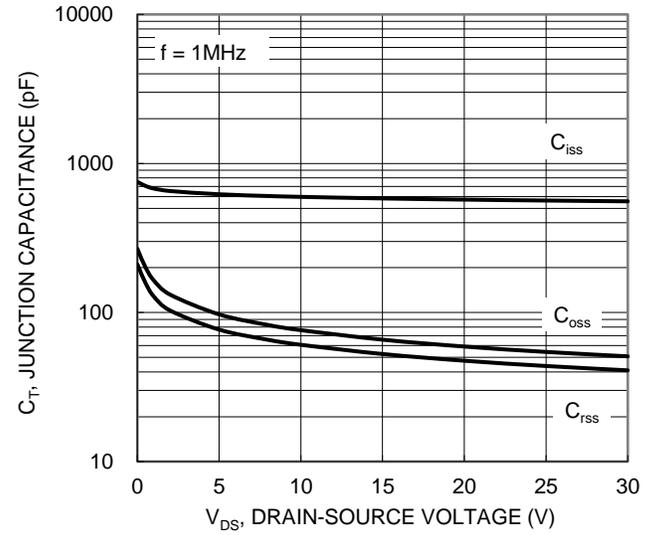


Figure 23. Typical Junction Capacitance

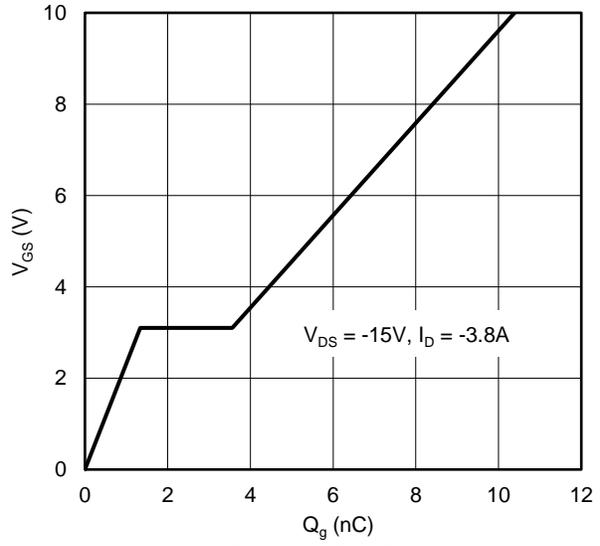


Figure 24. Gate Charge

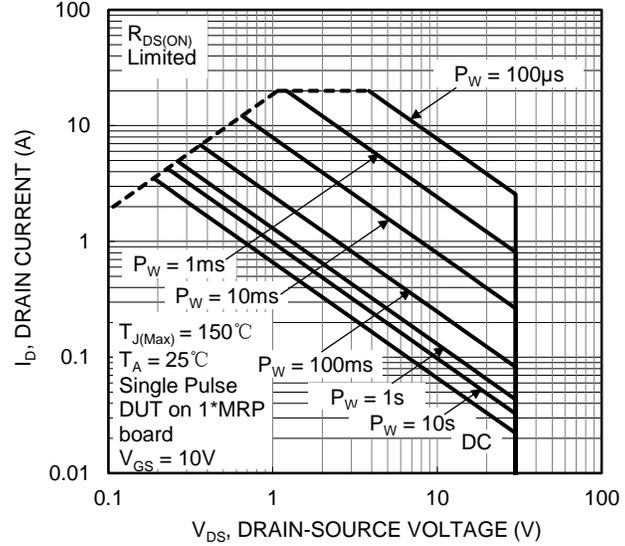
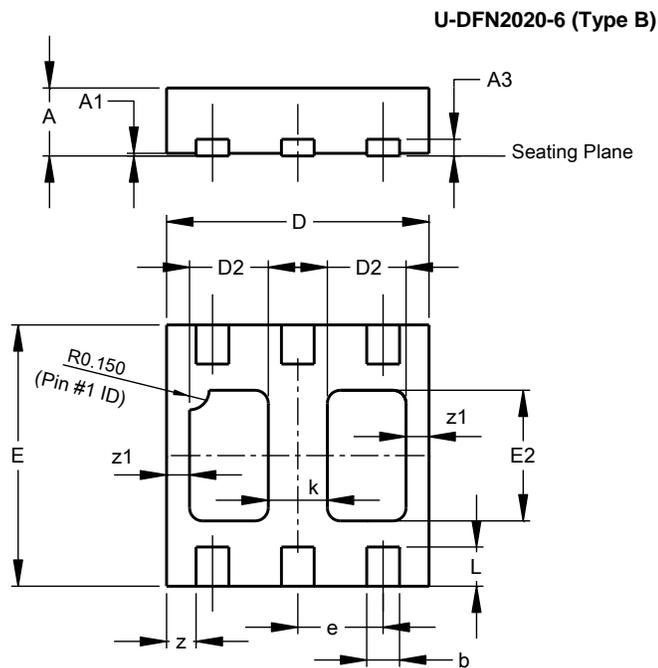


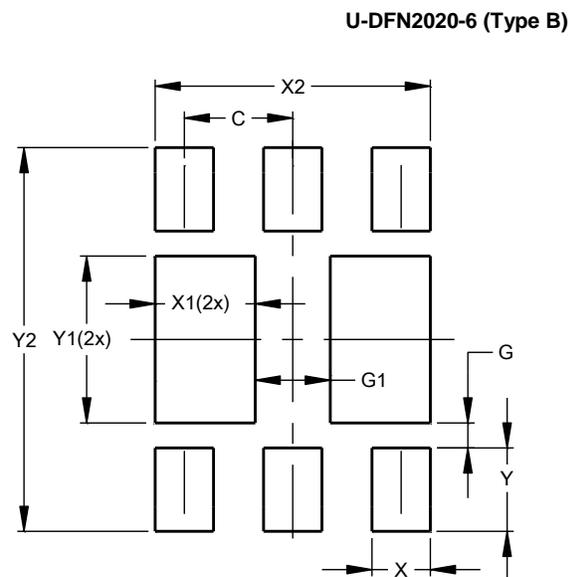
Figure 25. SOA, Safe Operation Area

Package Outline Dimensions



U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
G	0.150
G1	0.450
X	0.350
X1	0.600
X2	1.650
Y	0.500
Y1	1.000
Y2	2.300