

Product Summary

Device	BV _{DSS}	R _{DS(ON)} max	I _D MAX T _A = +25°C
Q1 N-Channel	12V	29mΩ @ V _{GS} = 4.5V	5.6A
		34mΩ @ V _{GS} = 2.5V	5.1A
		44mΩ @ V _{GS} = 1.8V	4.5A
		65mΩ @ V _{GS} = 1.5V	3.7A
Q2 P-Channel	-12V	61mΩ @ V _{GS} = -4.5V	-3.8A
		81mΩ @ V _{GS} = -2.5V	-3.3A
		115mΩ @ V _{GS} = -1.8V	-2.8A
		210mΩ @ V _{GS} = -1.5V	-2.3A

Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height

Description

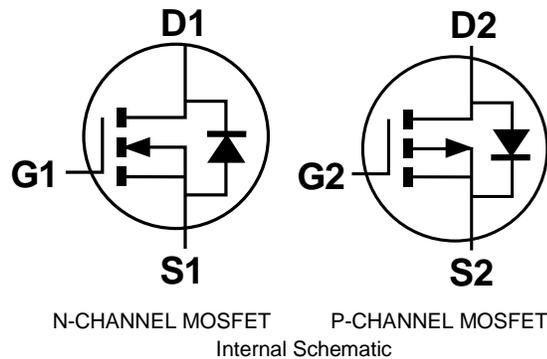
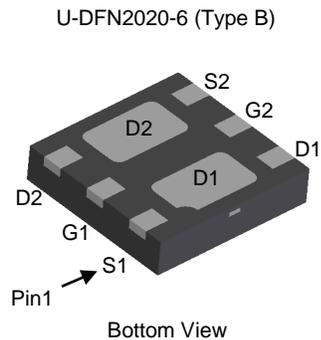
This MOSFET has been designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Load Switch
- Power Management Functions
- Portable Power Adaptors

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 NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208⁽⁴⁾
- 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}	12	-12	V
Gate-Source Voltage			V _{GSS}	±8	±8	V
Continuous Drain Current (Note 5) V _{GS} = 4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	5.6 4.4	-3.8 -3.0	A
	t < 5s	T _A = +25°C T _A = +70°C	I _D	7.2 5.8	-5.0 -4.0	A
Maximum Continuous Body Diode Forward Current (Note 5)			I _S	1	-1	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	20	-15	A
Avalanche Current (L = 0.1mH)			I _{AS}	15	-12	A
Avalanche Energy (L = 0.1mH)			E _{AS}	12	8	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	Steady State	P _D	1.4	W
	t < 5s		2.2	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	91	°C/W
	t < 5s		55	
Thermal Resistance, Junction to Case		R _{θJC}	20	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Note: 5. Device mounted on 1" × 1" FR-4 PCB with high coverage 2oz. Copper, single sided.

Electrical Characteristics Q1 N-CHANNEL (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	12	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1.0	μA	V _{DS} = 12V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	0.4	—	1	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	17	29	mΩ	V _{GS} = 4.5V, I _D = 5A
		—	20	34		V _{GS} = 2.5V, I _D = 4.6A
		—	24	44		V _{GS} = 1.8V, I _D = 4.1A
		—	30	65		V _{GS} = 1.5V, I _D = 2A
Diode Forward Voltage	V _{SD}	—	0.6	1.2	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{ISS}	—	914	—	pF	V _{DS} = 6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	132	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	119	—	pF	
Gate Resistance	R _g	—	1.26	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	10.5	—	nC	V _{DS} = 6V, I _D = 6.5A
Total Gate Charge (V _{GS} = 8V)		—	19.6	—	nC	
Gate-Source Charge	Q _{gs}	—	1.2	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.6	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.0	—	ns	V _{DD} = 6V, V _{GS} = 4.5V, R _L = 1.2Ω, R _G = 1Ω
Turn-On Rise Time	t _r	—	10.5	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	16.6	—	ns	
Turn-Off Fall Time	t _f	—	4.1	—	ns	

Electrical Characteristics Q2 P-CHANNEL (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	-12	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1.0	μA	V _{DS} = -12V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	-0.4	—	-1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	37	61	mΩ	V _{GS} = -4.5V, I _D = -3.6A
		—	47	81		V _{GS} = -2.5V, I _D = -3.2A
		—	63	115		V _{GS} = -1.8V, I _D = -1A
		—	90	210		V _{GS} = -1.5V, I _D = -1A
Diode Forward Voltage	V _{SD}	—	-0.65	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{ISS}	—	915	—	pF	V _{DS} = -6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	225	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	183	—	pF	
Gate Resistance	R _g	—	56.9	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	10.7	—	nC	V _{DS} = -6V, I _D = -4.3A
Total Gate Charge (V _{GS} = -8V)		—	17.9	—	nC	
Gate-Source Charge	Q _{gs}	—	1.7	—	nC	
Gate-Drain Charge	Q _{gd}	—	3.0	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.7	—	ns	V _{DD} = -6V, V _{GS} = -4.5V, R _L = 1.6Ω, R _G = 1Ω
Turn-On Rise Time	t _r	—	11.5	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	27.8	—	ns	
Turn-Off Fall Time	t _f	—	26.4	—	ns	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

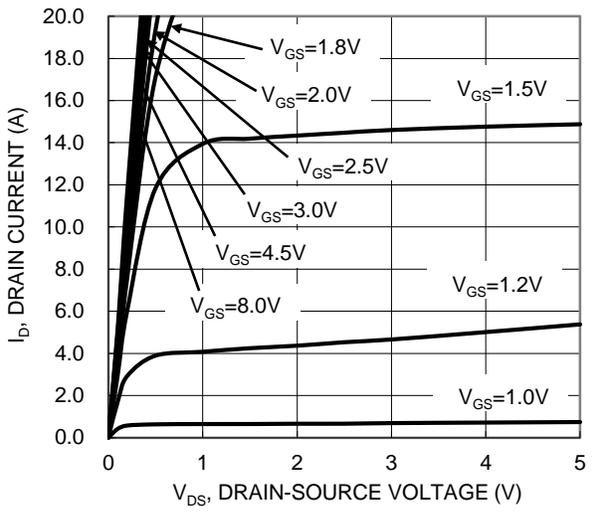


Figure 1. Typical Output Characteristic

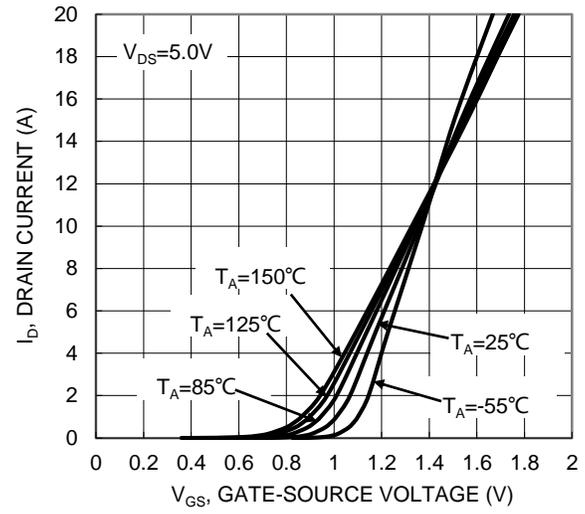


Figure 2. Typical Transfer Characteristic

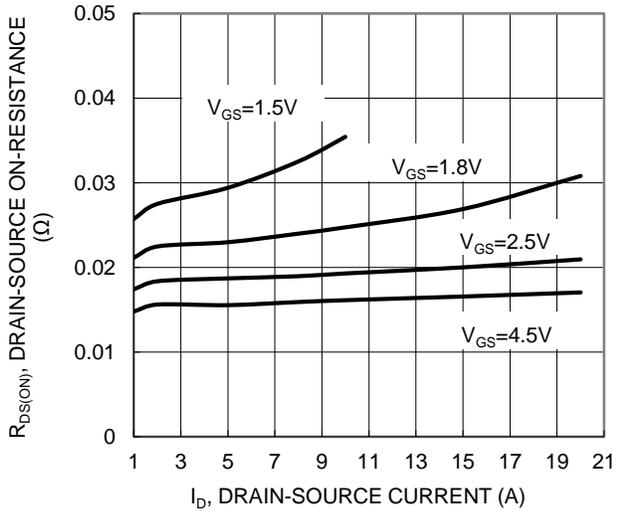


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

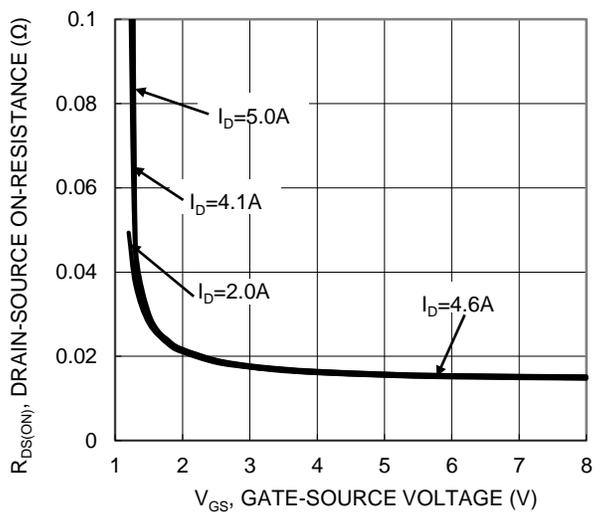


Figure 4. Typical Transfer Characteristic

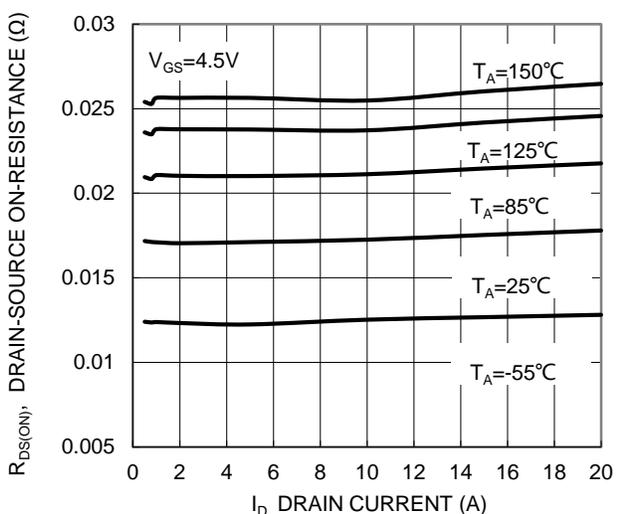


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

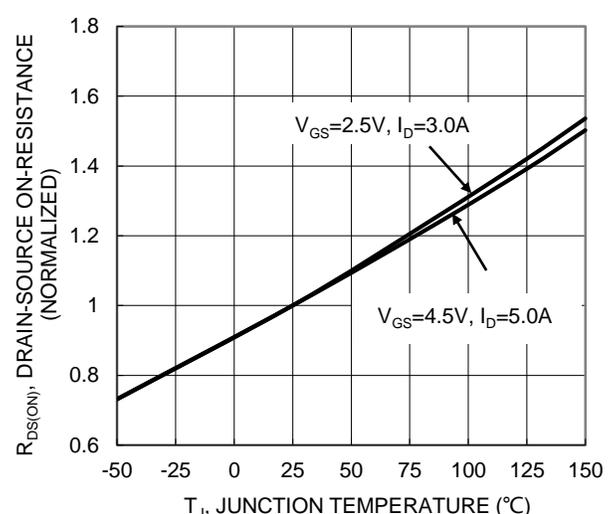


Figure 6. On-Resistance Variation with Temperature

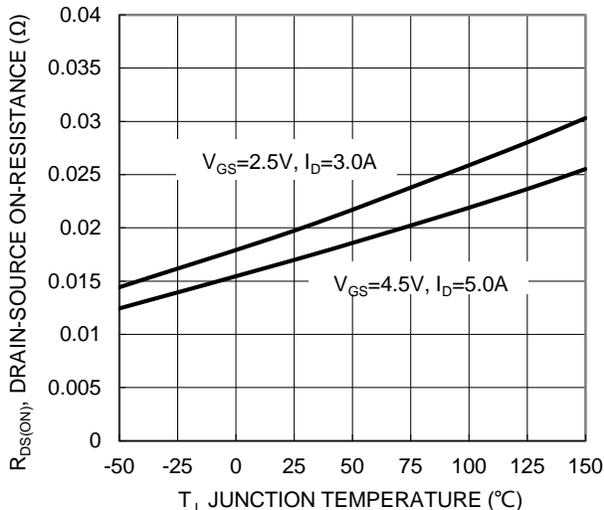


Figure 7. On-Resistance Variation with Temperature

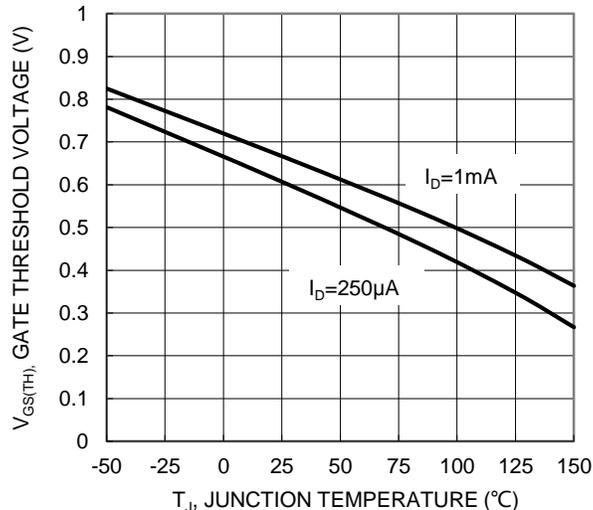


Figure 8. Gate Threshold Variation vs. Junction Temperature

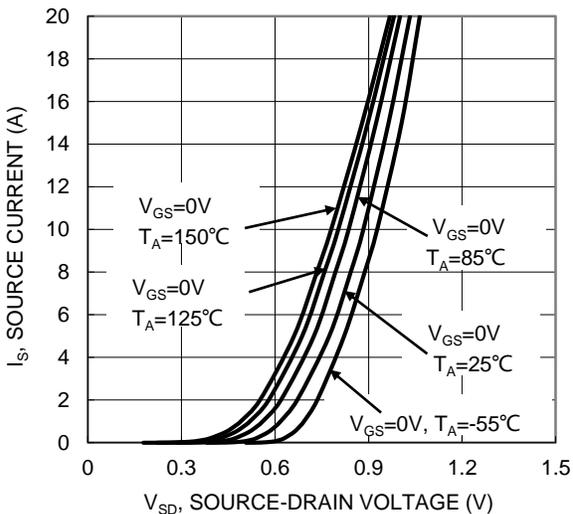


Figure 9. Diode Forward Voltage vs. Current

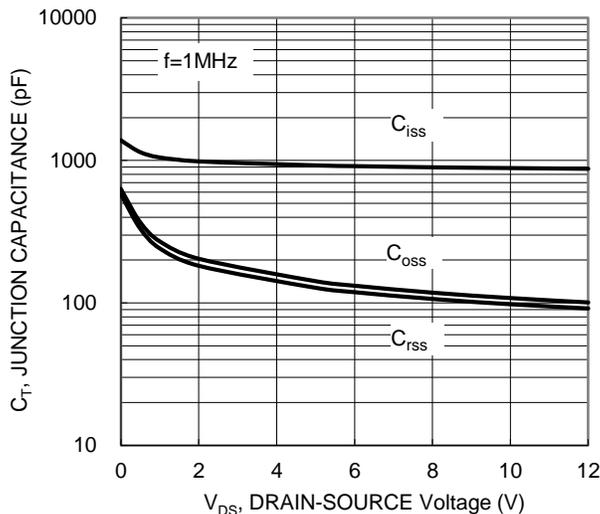


Figure 10. Typical Junction Capacitance

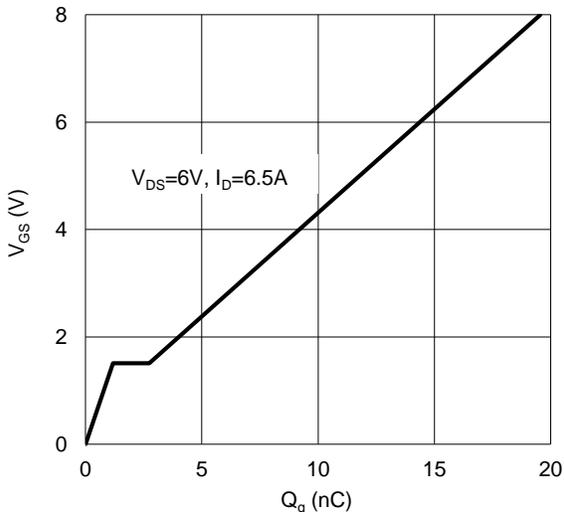


Figure 11. Gate Charge

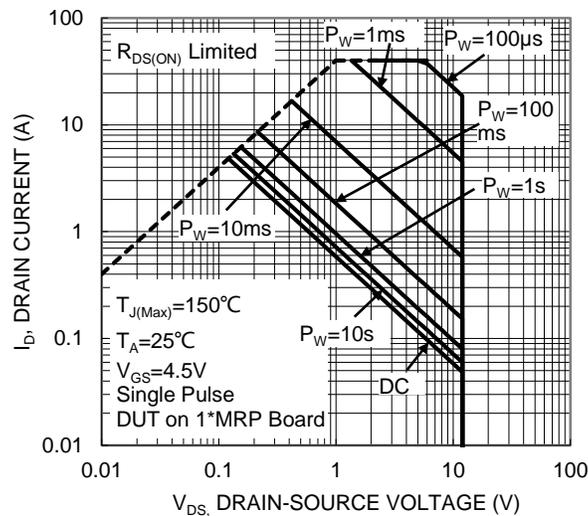


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

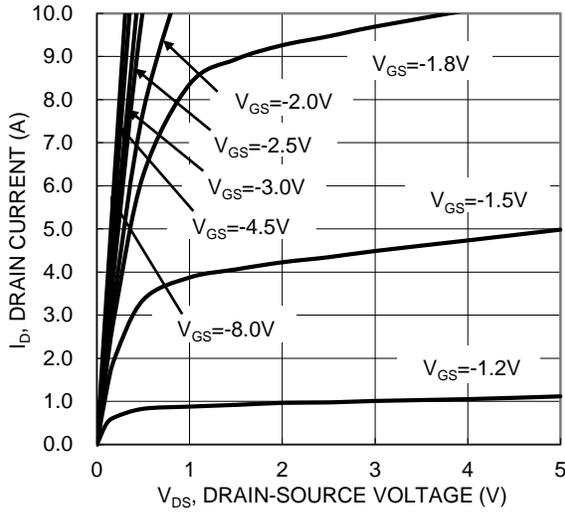


Figure 13. Typical Output Characteristic

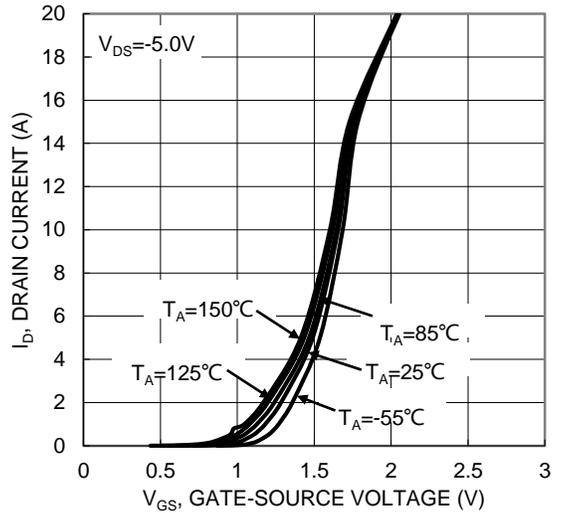


Figure 14. Typical Transfer Characteristic

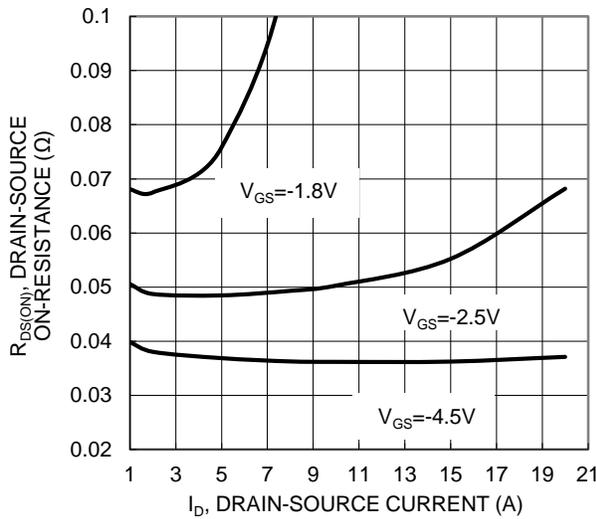


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

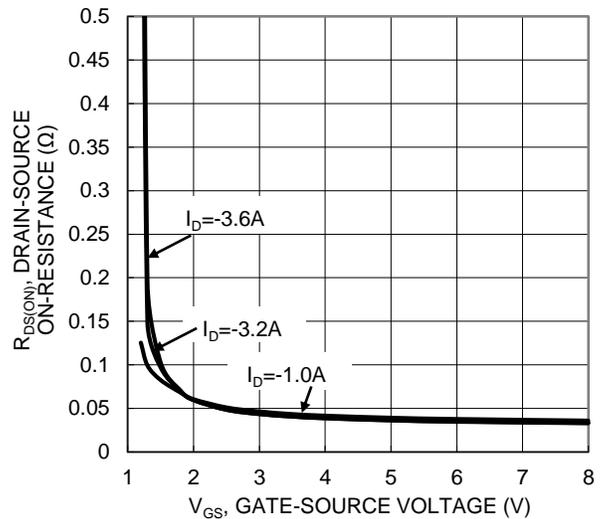


Figure 16. Typical Transfer Characteristic

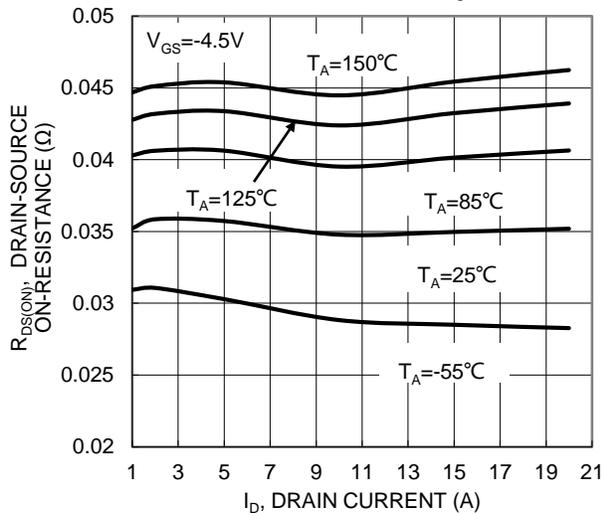


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

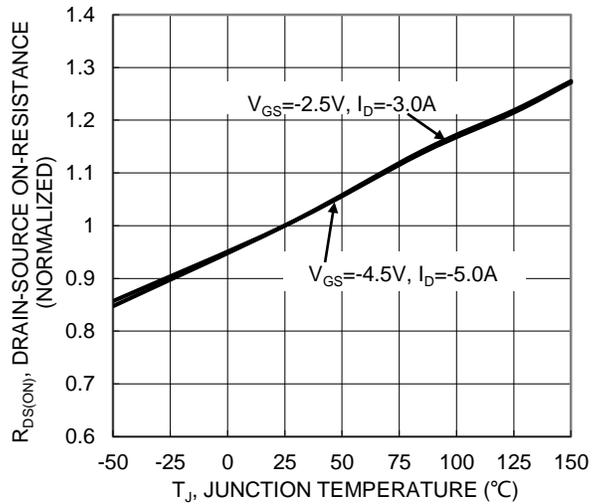


Figure 18. On-Resistance Variation with Temperature

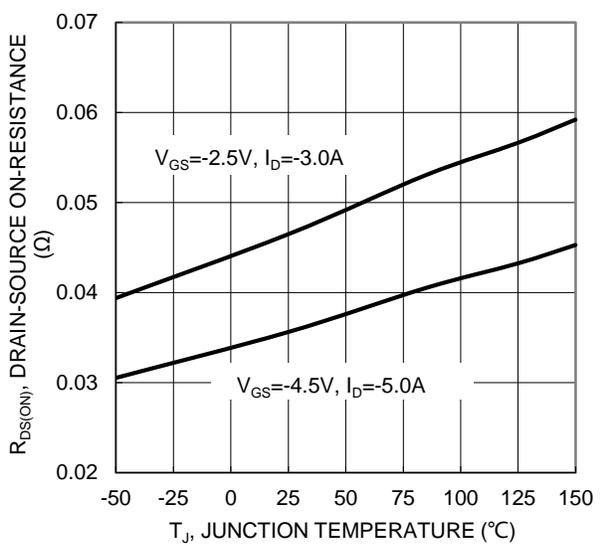


Figure 19. On-Resistance Variation with Temperature

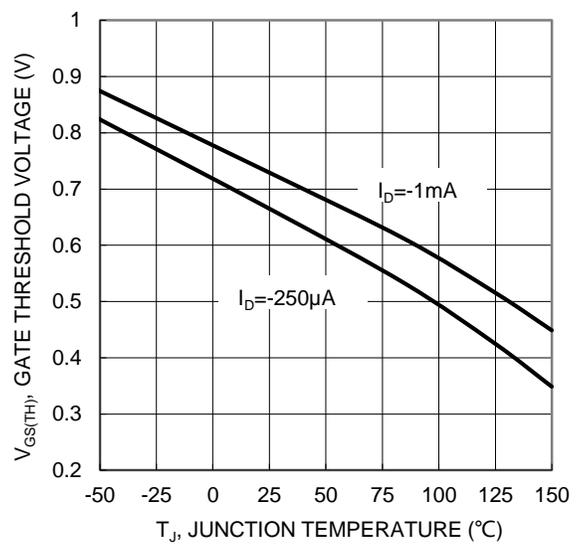


Figure 20. Gate Threshold Variation vs. Junction Temperature

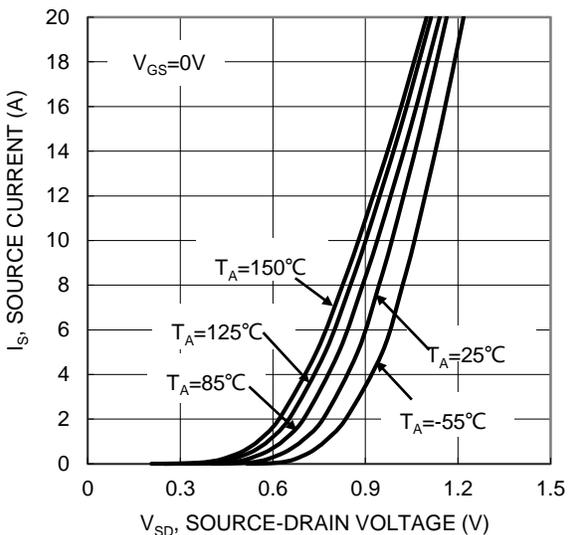


Figure 21. Diode Forward Voltage vs. Current

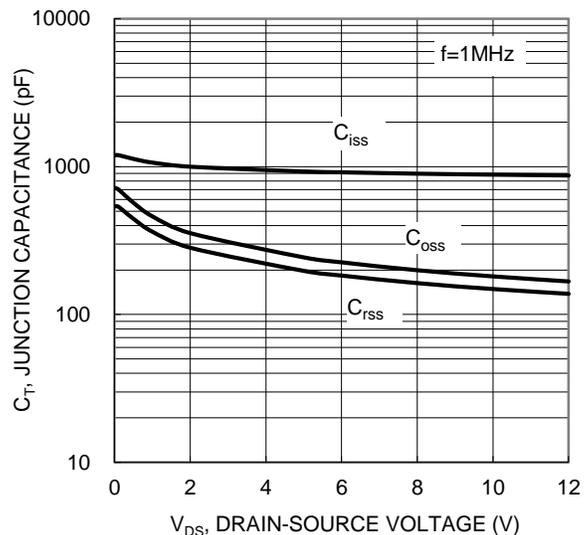


Figure 22. Typical Junction Capacitance

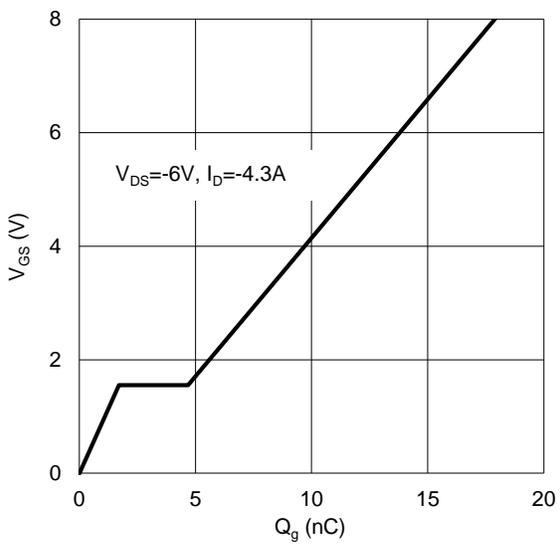


Figure 23. Gate Charge

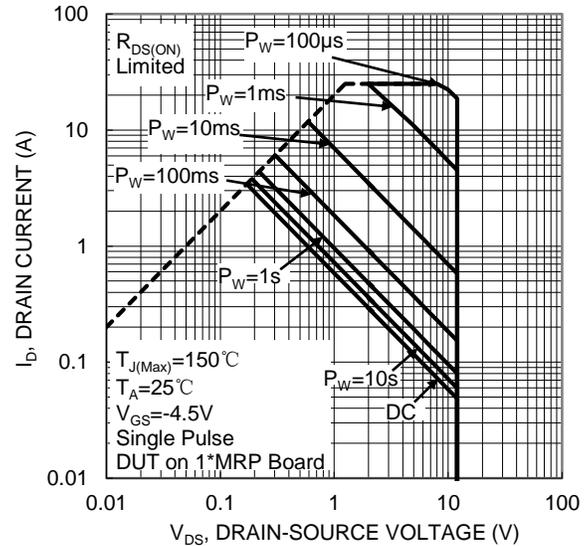


Figure 24. SOA, Safe Operation Area

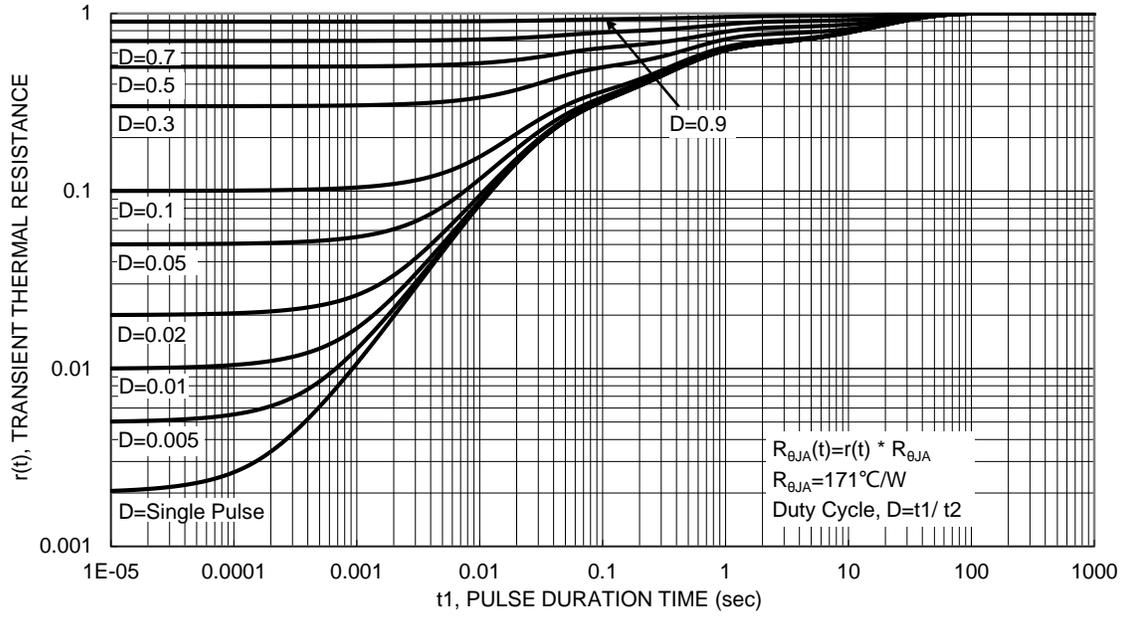
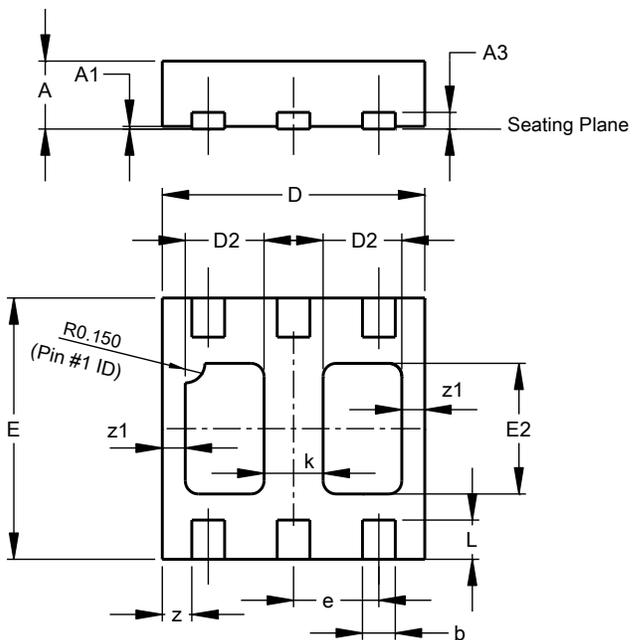


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

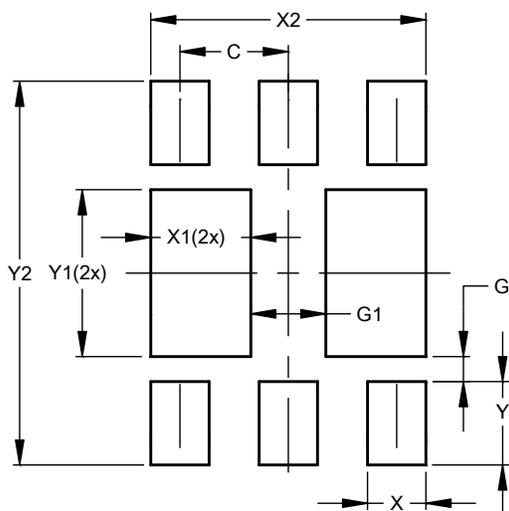
U-DFN2020-6 (Type B)



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

U-DFN2020-6 (Type B)



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