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

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_A = +25°C$
Q1	30V	20mΩ @ V_{GS} = 10V	8A
		32mΩ @ V_{GS} = 4.5V	6.3A
Q2	30V	11.1mΩ @ V_{GS} = 10V	10.7A
		13.8mΩ @ V_{GS} = 4.5V	9.6A

Description

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.

Applications

- Mobile Computing
- Point of Load

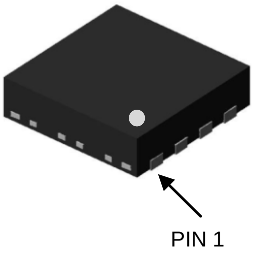
Features

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

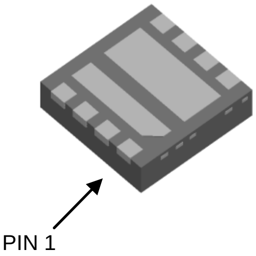
Mechanical Data

- Case: V-DFN3030-8 (Type K)
- 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
- Weight: 0.02 grams (Approximate)

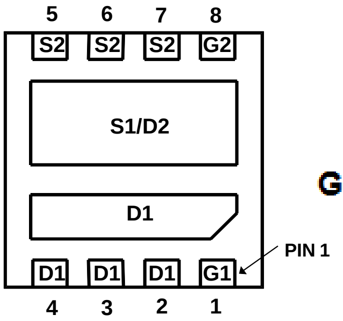
V-DFN3030-8 (Type K)



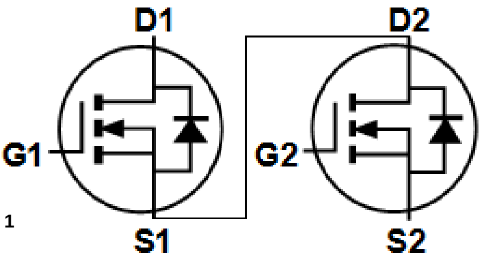
Top View



Bottom View



Bottom View
Internal Schematic



Equivalent Circuit

Maximum Ratings (Q1 N-Channel) (@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 5) V_{GS} = 10V	Steady State	T_A = +25°C T_C = +25°C	I_D	8 21.5	A
Maximum Body Diode Forward Current (Note 5)			I_S	2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	55	A
Avalanche Current (L = 0.1mH)			I_{AS}	14	A
Avalanche Energy (L = 0.1mH)			E_{AS}	9.8	mJ

Maximum Ratings (Q2 N-Channel) (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	+20 -16	V
Continuous Drain Current (Note 5) V_{GS} = 10V	Steady State	T_A = +25°C T_C = +25°C	I_D	10.7 28.9	A
Maximum Body Diode Forward Current (Note 5)			I_S	2	A
Pulsed Drain Current (10µs Pulse, Duty cycle = 1%)			I_{DM}	80	A
Avalanche Current (L = 0.1mH)			I_{AS}	18	A
Avalanche Energy (L = 0.1mH)			E_{AS}	16.2	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	65	°C/W
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.9	W
Thermal Resistance, Junction to Case (Note 5)	Steady State	$R_{\theta JC}$	9	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	13.9	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.

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}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	20	mΩ	V_{GS} = 10V, I_D = 6A
		—	—	32		V_{GS} = 4.5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 6A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	641	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	66	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	50	—	pF	
Gate Resistance	R_g	—	2.2	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	13.2	—	nC	V_{DS} = 15V, I_D = 10A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	6	—	nC	
Gate-Source Charge	Q_{gs}	—	1.7	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.2	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.3	—	nS	V_{GS} = 10V, V_{DS} = 15V, R_G = 6Ω, I_D = 1A
Turn-On Rise Time	t_R	—	4.4	—	nS	
Turn-Off Delay Time	$t_{D(OFF)}$	—	22.3	—	nS	
Turn-Off Fall Time	t_F	—	5.3	—	nS	
Reverse Recovery Time	t_{RR}	—	11.4	—	nS	I_F = 11A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	8.2	—	nC	

Electrical Characteristics (Q2 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}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = 24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = +20V, V_{DS} = 0V V_{GS} = -16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	11.1	mΩ	V_{GS} = 10V, I_D = 9A
		—	—	13.8		V_{GS} = 4.5V, I_D = 7A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 9A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	748	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	447	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	43	—	pF	
Gate Resistance	R_g	—	1.0	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	13.8	—	nC	V_{DS} = 15V, I_D = 14.4A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	6.4	—	nC	
Gate-Source Charge	Q_{gs}	—	2.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.2	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	V_{GS} = 10V, V_{DS} = 15V, R_G = 1Ω, I_D = 10A
Turn-On Rise Time	t_R	—	5.0	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	8.6	—	ns	
Turn-Off Fall Time	t_F	—	1.4	—	ns	
Reverse Recovery Time	t_{RR}	—	18	—	ns	I_F = 10A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	7.7	—	nC	

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

Typical Characteristics (Q1 N-Channel)

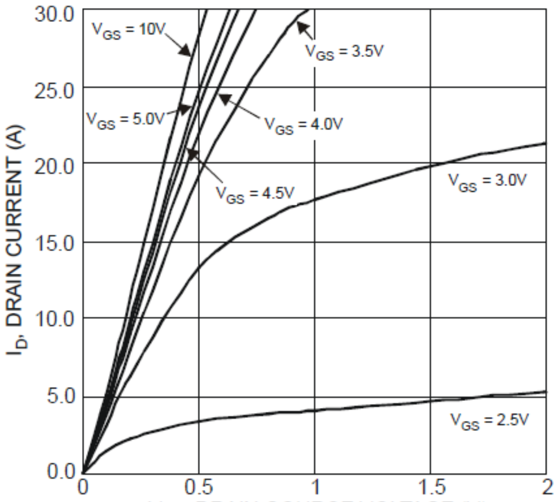


Figure 1 Typical Output Characteristic

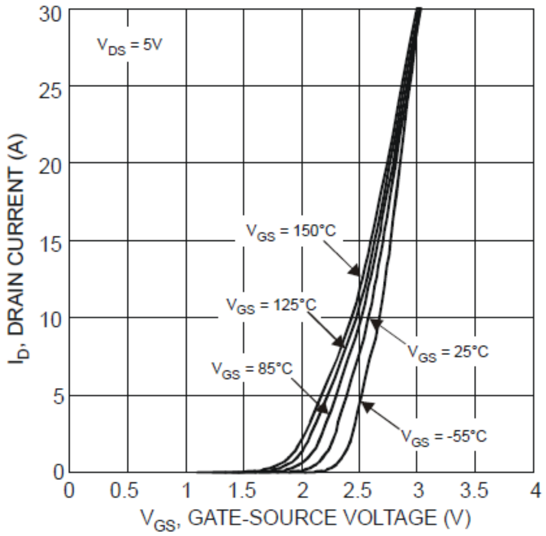


Figure 2 Typical Transfer Characteristic

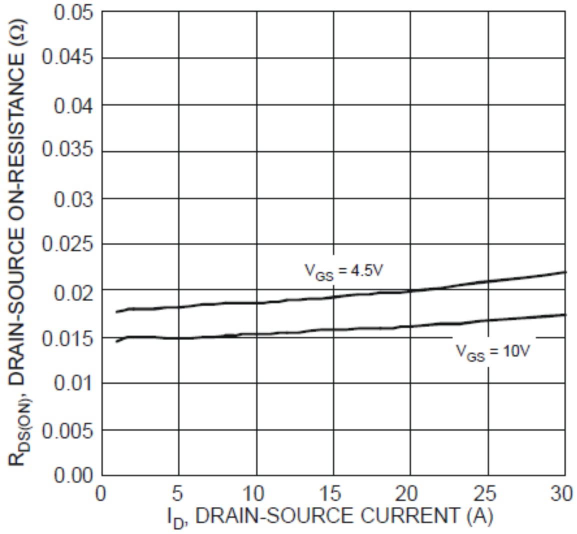


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

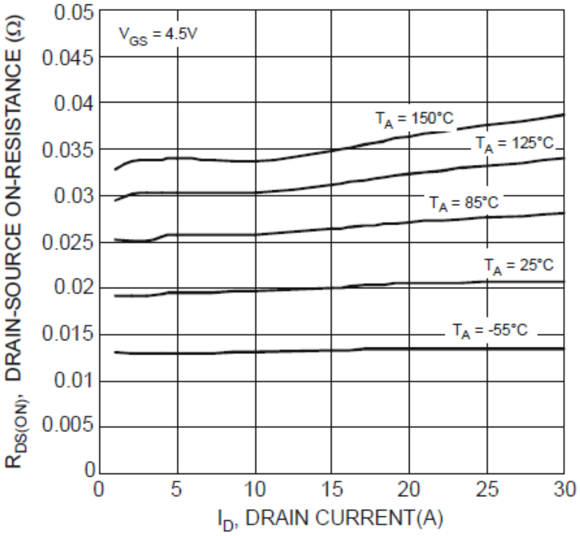


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

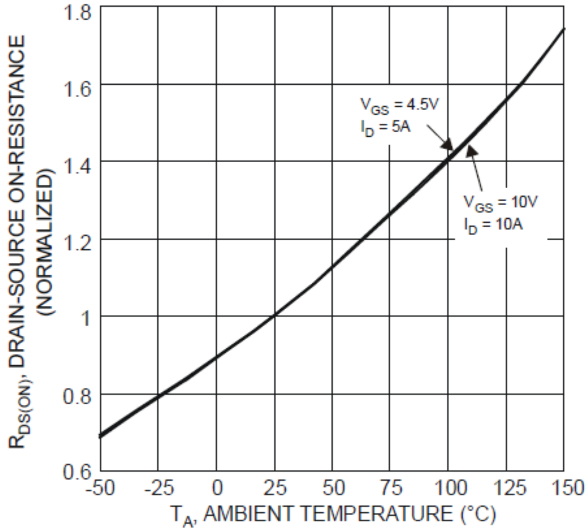


Figure 5 On-Resistance Variation with Temperature

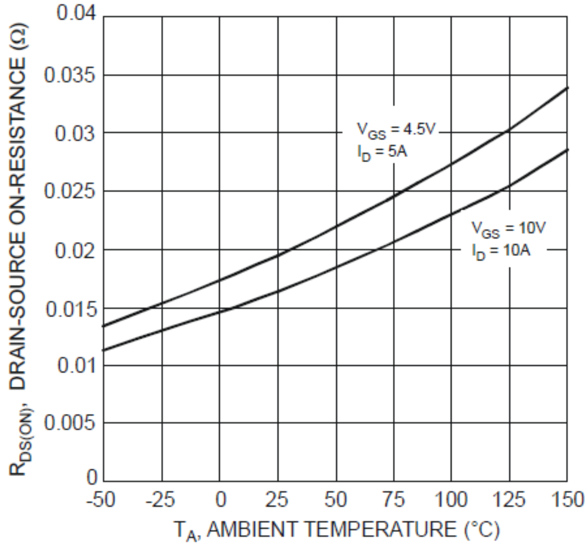


Figure 6 On-Resistance Variation with Temperature

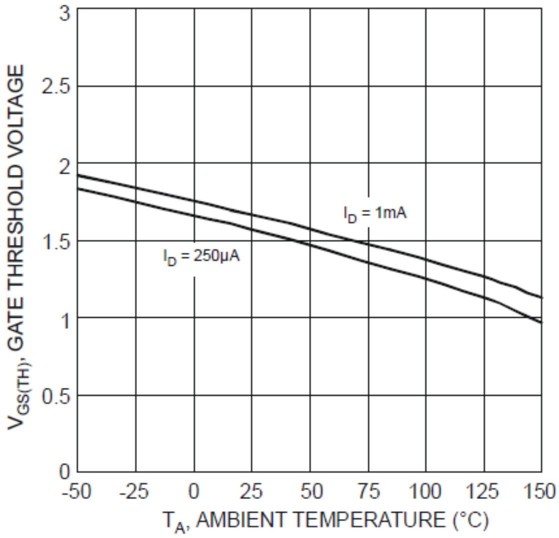


Figure 7 Gate Threshold Variation vs. Ambient Temperature

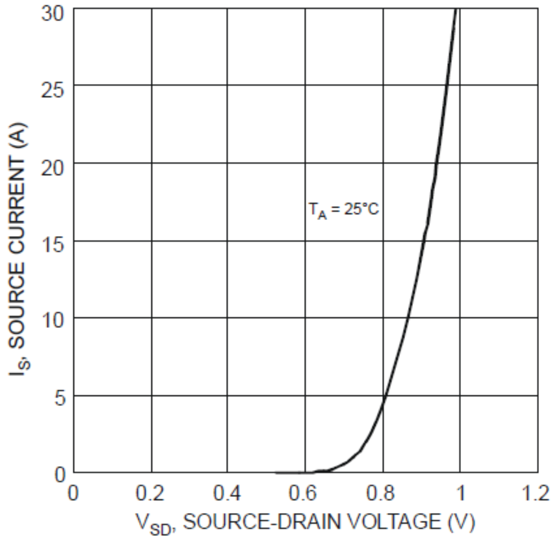


Figure 8 Diode Forward Voltage vs. Current

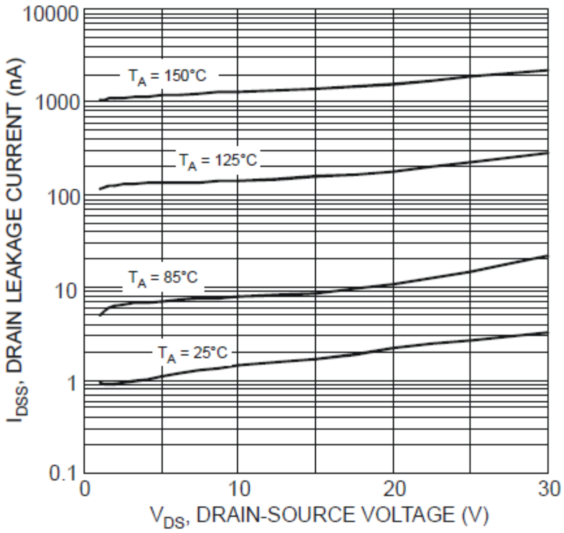


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

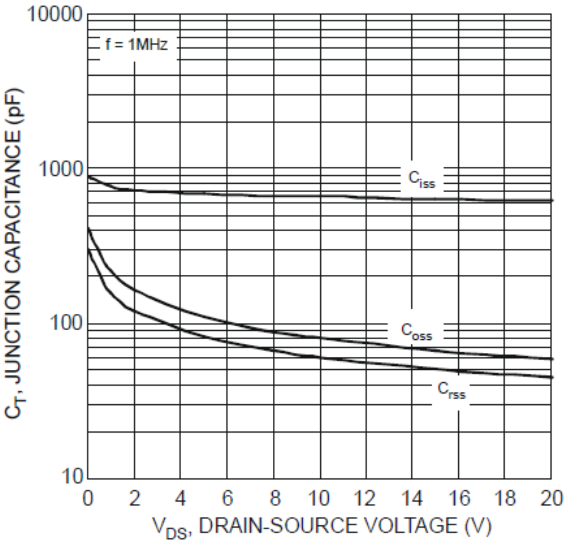


Figure 10 Typical Junction Capacitance

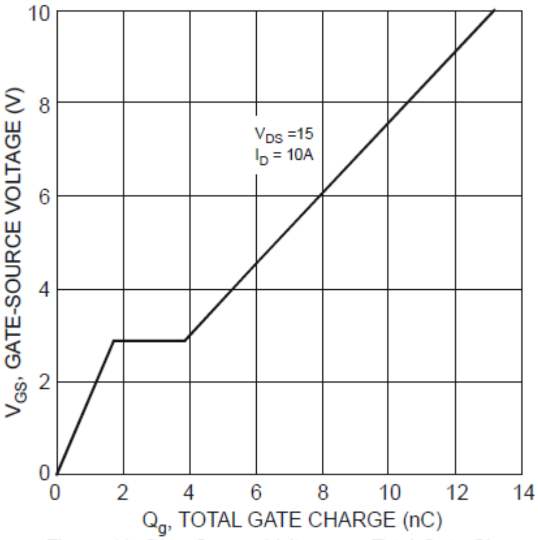


Figure 11 Gate-Source Voltage vs. Total Gate Charge

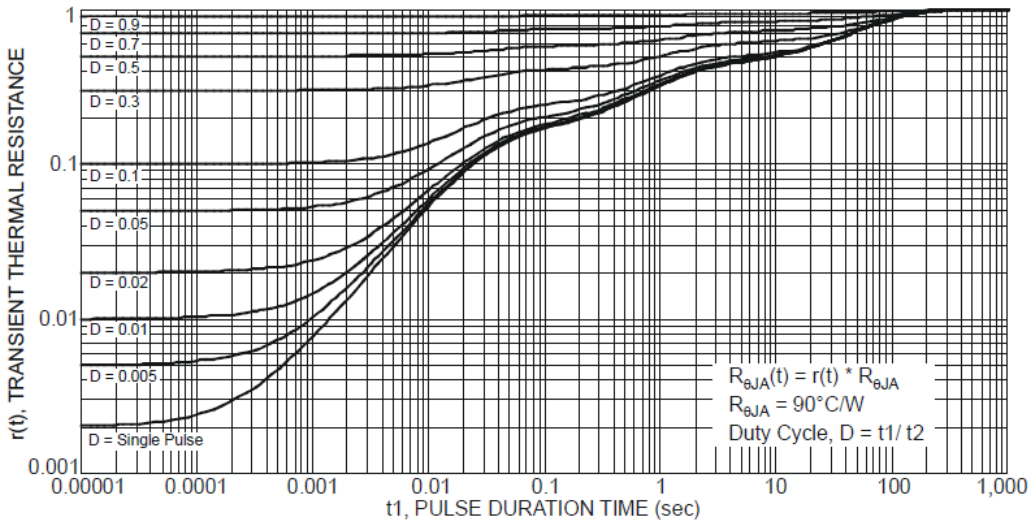


Figure 12 Transient Thermal Resistance

Typical Characteristics (Q2 N-Channel)

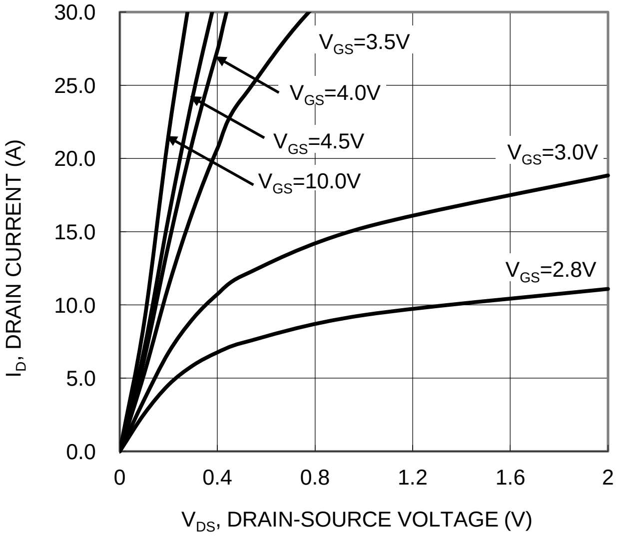


Figure 13. Typical Output Characteristic

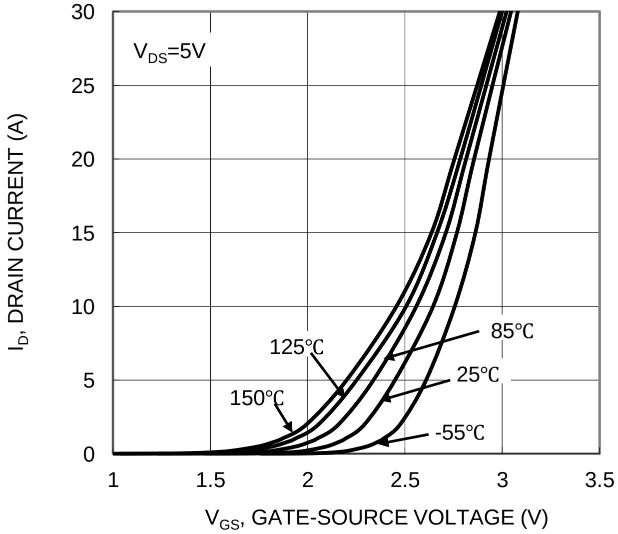


Figure 14. Typical Transfer Characteristic

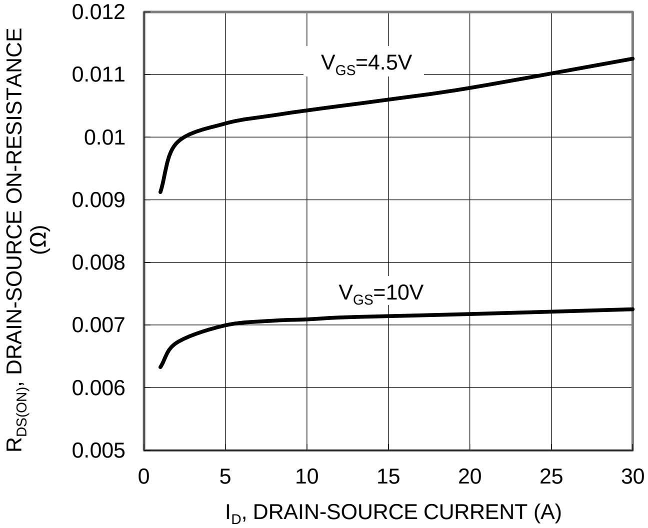


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

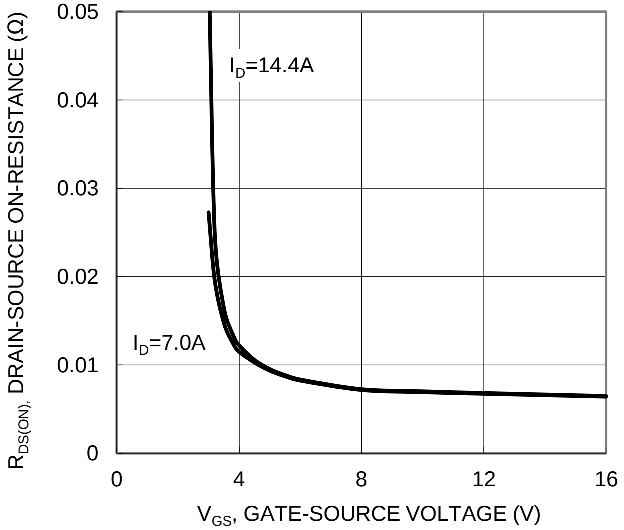


Figure 16. Typical Transfer Characteristic

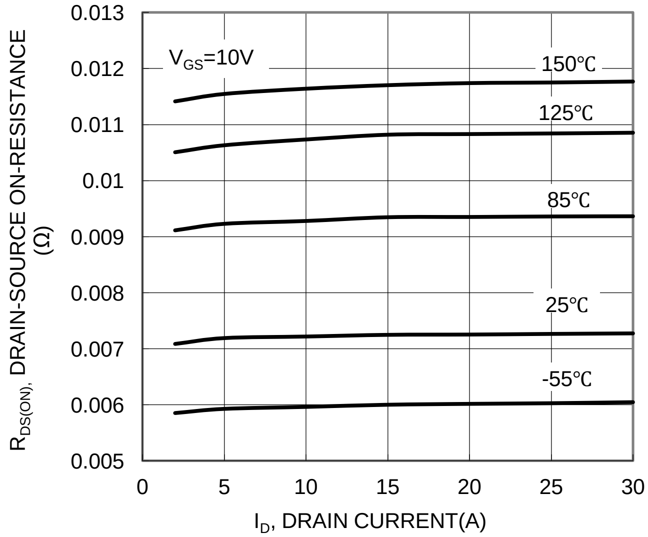


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

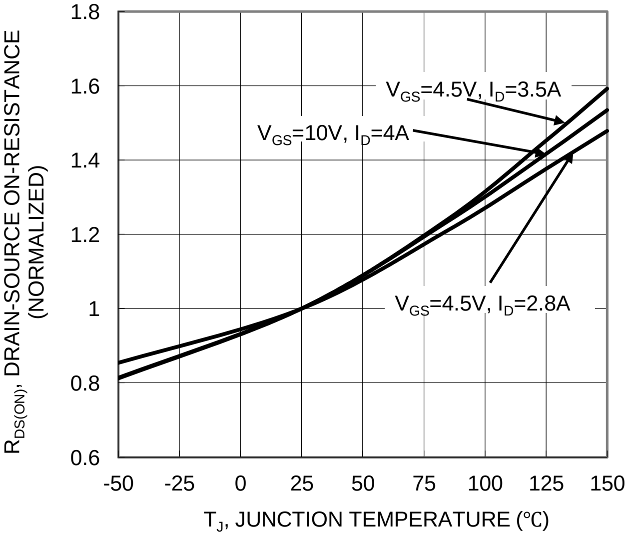


Figure 18. On-Resistance Variation with Junction Temperature

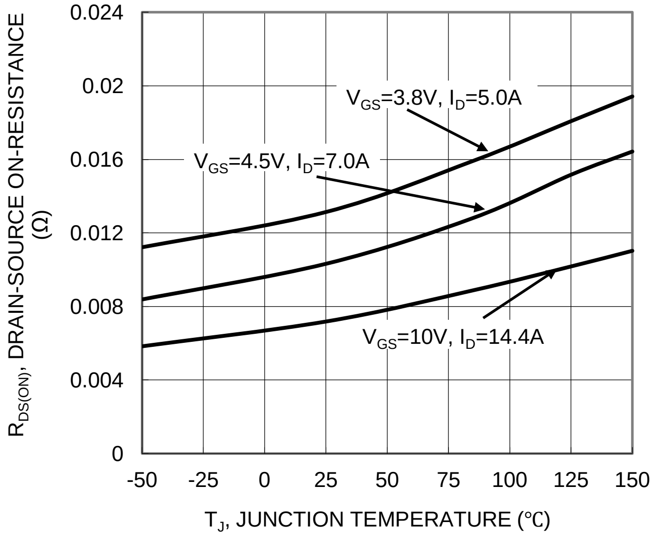


Figure 19. On-Resistance Variation with Junction Temperature

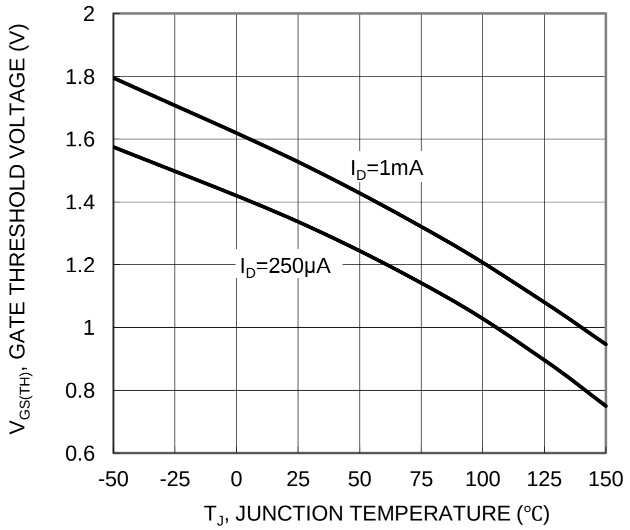


Figure 20. Gate Threshold Variation vs. Junction Temperature

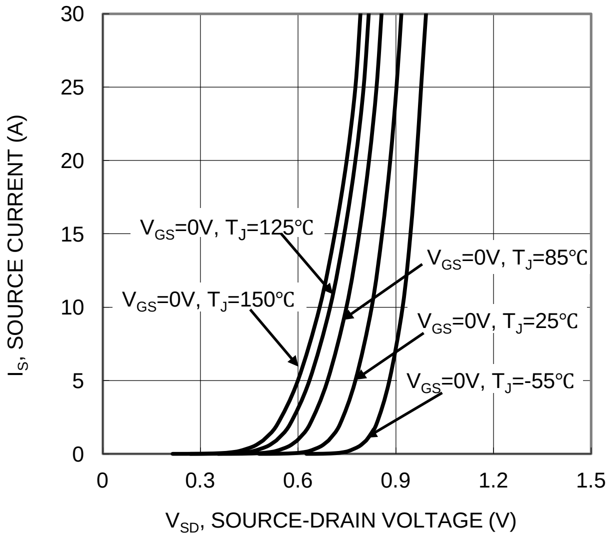


Figure 21. Diode Forward Voltage vs. Current

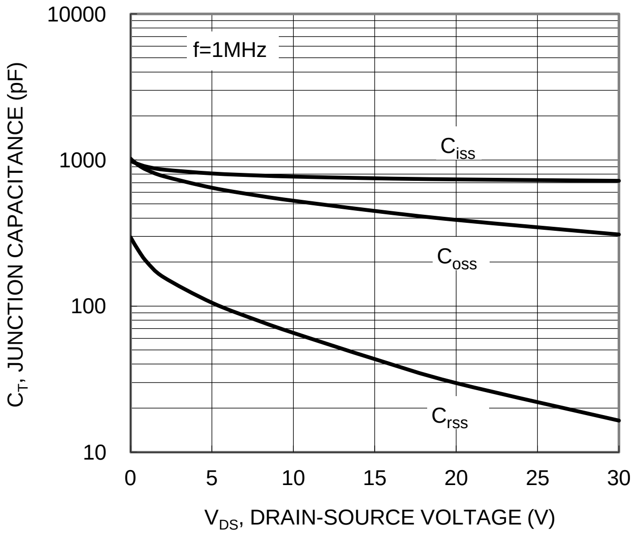


Figure 22. Typical Junction Capacitance

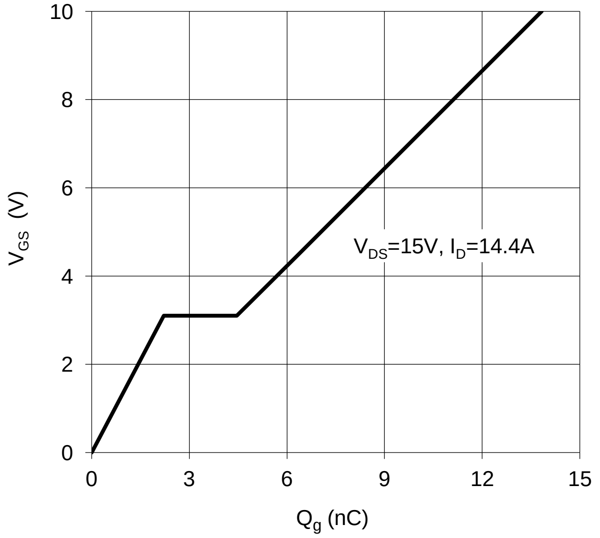


Figure 23. Gate Charge

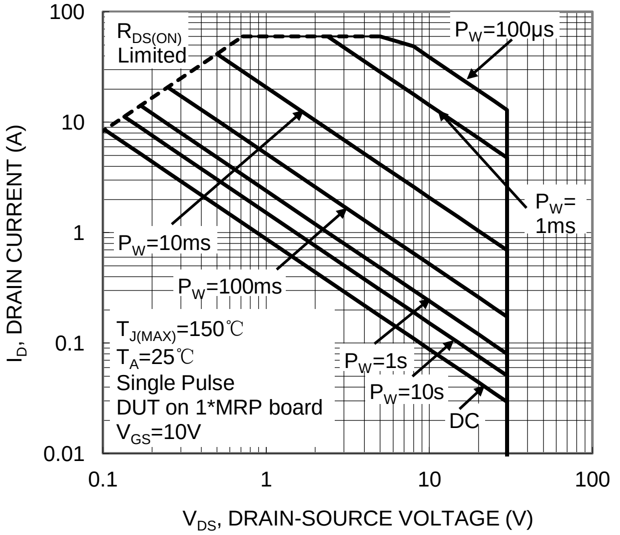


Figure 24. SOA, Safe Operation Area

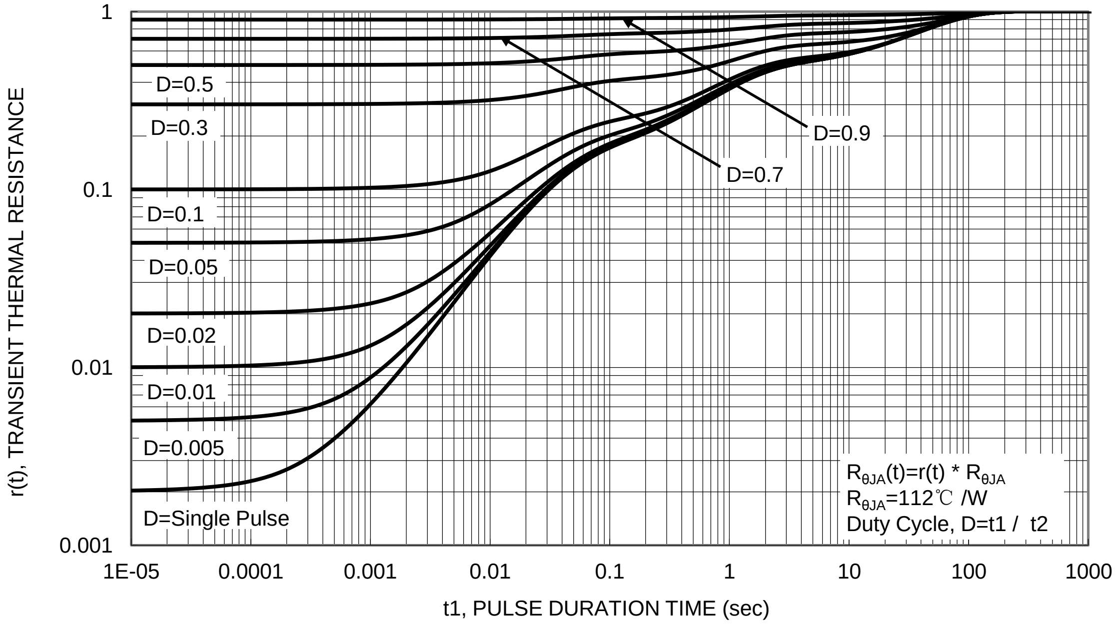
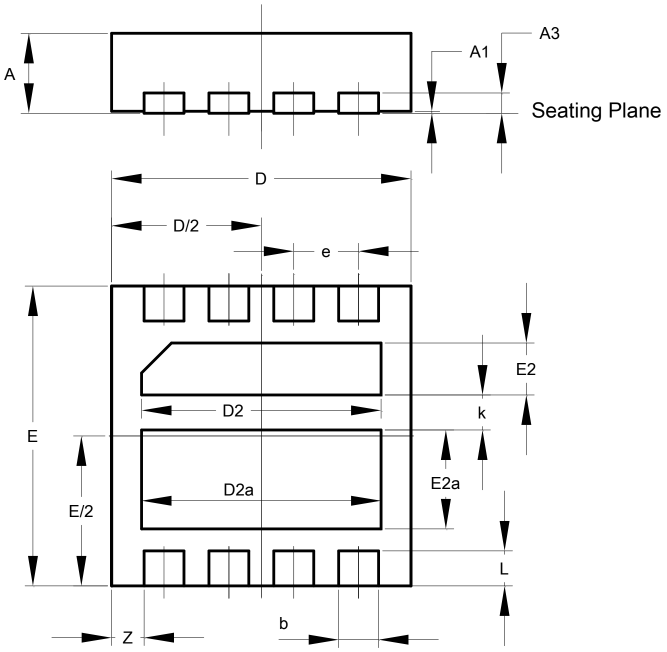


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

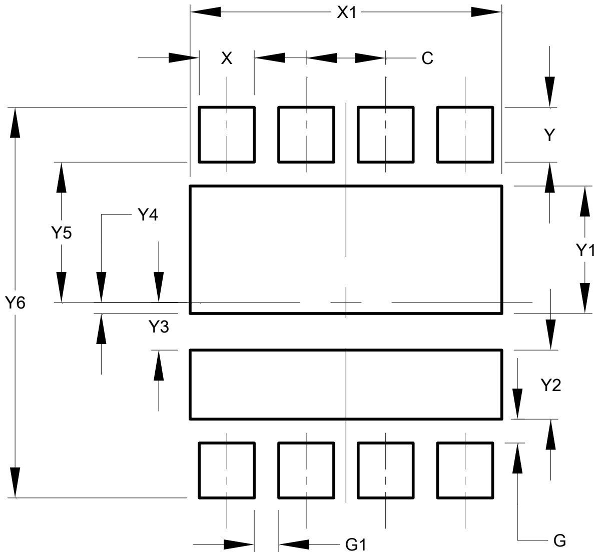
V-DFN3030-8 (Type K)



V-DFN3030-8 (Type K)			
Dim	**Min**	**Max**	**Typ**
A	0.77	0.85	0.80
A1	0	0.05	0.02
A3	0.20BSC		
b	0.35	0.45	0.40
D	2.95	3.050	3.00
D2	2.30	2.50	2.40
D2a	2.30	2.50	2.40
E	2.95	3.050	3.00
E2	0.42	0.62	0.52
E2a	0.89	1.09	0.99
e	0.65BSC		
k	-	-	0.35
L	0.30	0.40	0.35
z	0.325BSC		
All Dimensions in mm			

Suggested Pad Layout

V-DFN3030-8 (Type K)



Dimensions	Value (in mm)
C	0.650
G	0.195
G1	0.200
X	0.450
X1	2.550
Y	0.450
Y1	1.044
Y2	0.566
Y3	0.389
Y4	0.089
Y5	1.150
Y6	3.200