30V Dual Asymmetric N-Ch Power MOSFET

Features

- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge, Q_g
- 100% UIS and R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

Product Summary

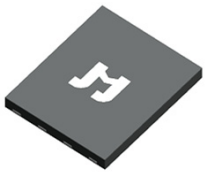
Parameter	Value		Unit
	Q1	Q2	
V_{DS}	30	30	V
$V_{GS(th)\_Typ}$	1.8	1.7	V
I_D (@ V_{GS} = 10V) (1)	63	161	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	3.7	1.7	mΩ
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 4.5V)	5.8	2.6	mΩ

Applications

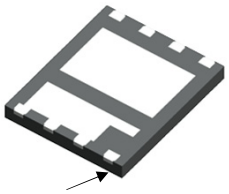
- Current Switching in DC/DC Sub-systems
- Power Management in Computing, CE, IE 4.0, Communications

DFN5060-8L-C

Top View

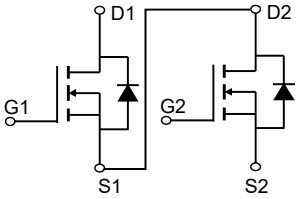


Bottom View

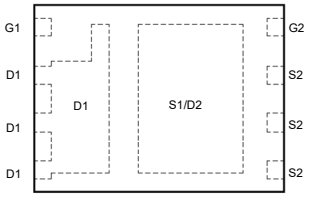


Pin Configuration

Schematic



Top View



Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSL0302AGND-13	DFN5060-8L-C	8	SL0302AD	1	-55 to 150	13-inch Reel	5000

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value		Unit
			Q1	Q2	
Drain-to-Source Voltage		V_{DS}	30	30	V
Gate-to-Source Voltage		V_{GS}	±20	±12	V
Continuous Drain Current (1)	T_C = 25°C	I_D	63	161	A
	T_C = 100°C		40	102	
Continuous Drain Current	T_A = 25°C		18	27	A
	T_A = 70°C		14.0	21	
Pulsed Drain Current (2)		I_{DM}	203	643	A
Avalanche Current (3)		I_{AS}	18.0	38	A
Avalanche Energy (3)		E_{AS}	49	217	mJ
Power Dissipation (4)	T_C = 25°C	P_D	30	83	W
	T_C = 100°C		11.9	33	
Power Dissipation (5)	T_A = 25°C		2.3	2.3	W
	T_A = 70°C		1.5	1.5	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150		°C

Thermal Performance

Parameter	Symbol	Typ.		Max.		Unit
		Q1	Q2	Q1	Q2	
Thermal Resistance, Junction-to-Ambient (4)	$R_{\theta JA}$	55	55	65	65	°C/W
Thermal Resistance, Junction-to-Case (5)	$R_{\theta JC}$	4.2	1.5	5.0	1.8	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board.
2. This single-pulse measurement was taken under T_{J_Max} = 150°C.

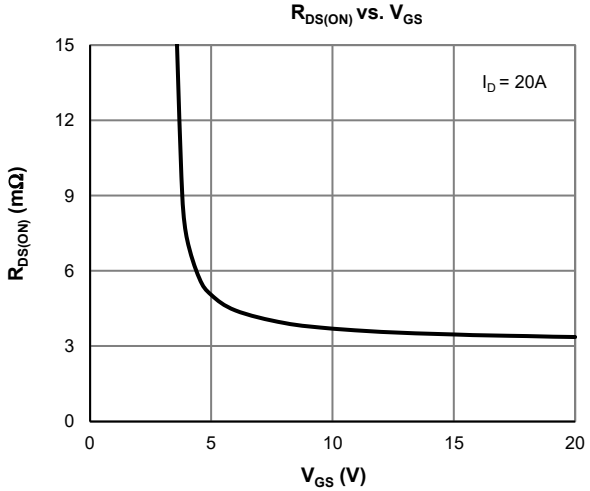
Electrical Characteristics - Q1 (@ T_J = 25°C unless otherwise specified)

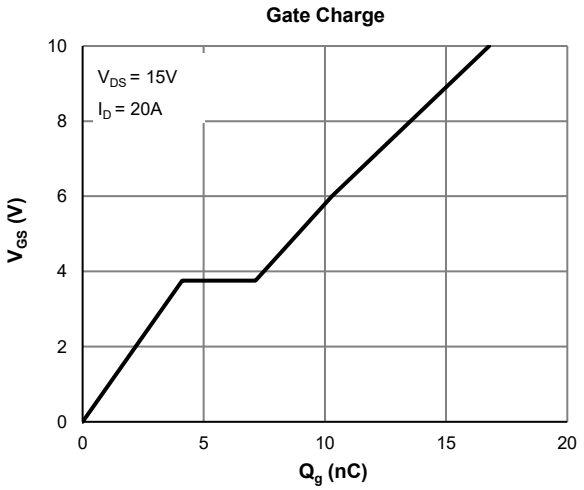
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 1.0mA, V_{GS} = 0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V			1.0	µA
		T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	1.2	1.8	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		3.7	4.7	mΩ
		V_{GS} = 4.5V, I_D = 15A		5.8	7.6	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		75		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.7	1.0	V
Diode Continuous Current	I_S	T_C = 25°C			30	A
DYNAMIC PARAMETERS [6]						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz		1058		pF
Output Capacitance	C_{oss}			880		pF
Reverse Transfer Capacitance	C_{rss}			60		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.0		Ω
SWITCHING PARAMETERS [6]						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 15V, I_D = 20A		16.8		nC
Total Gate Charge (@ V_{GS} = 4.5V)	Q_g			8.2		nC
Gate Source Charge	Q_{gs}			4.1		nC
Gate Drain Charge	Q_{gd}			3.0		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 15V R_L = 0.75Ω, R_{GEN} = 3Ω		8.5		ns
Turn-On Rise Time	t_r			66		ns
Turn-Off DelayTime	$t_{D(off)}$			17.8		ns
Turn-Off Fall Time	t_f			4.1		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 100A/µs		26		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/µs		9.0		nC

Notes:

3. This single-pulse measurement was taken under the following condition [L = 300mH, V_{GS} = 10V, V_{DD} = 15V] while its value is limited by T_{J_Max} = 150°C.

4. The power dissipation P_D is based on $R_{\theta JA}$ with t≤ 10s and the maximum allowed junction temperature of 150°C.





Typical Electrical & Thermal Characteristics - Q1

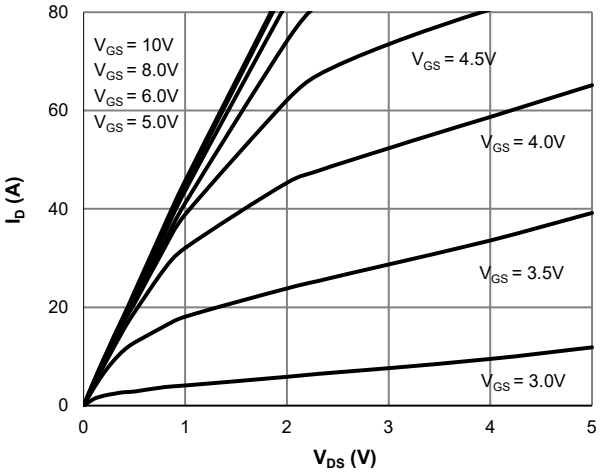


Figure 1: Saturation Characteristics

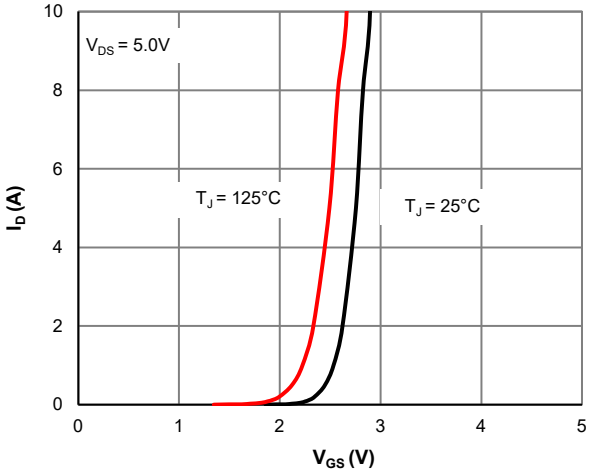


Figure 2: Transfer Characteristics

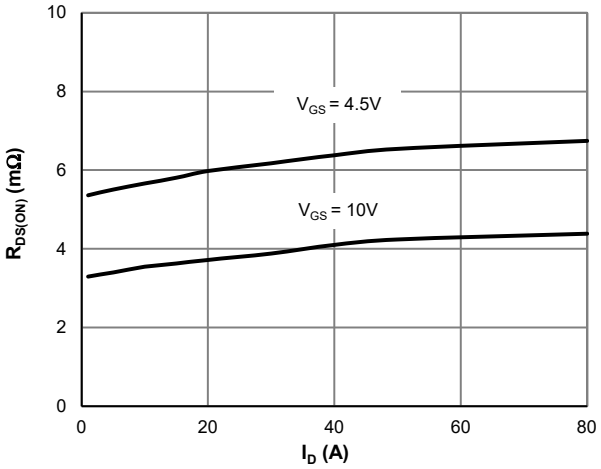


Figure 3: $R_{DS(ON)}$ vs. Drain Current

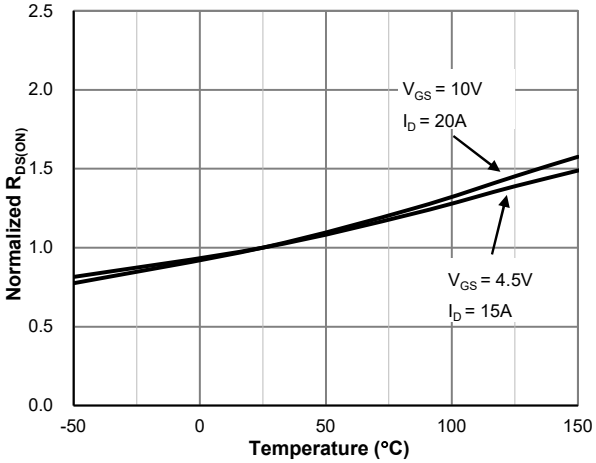


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

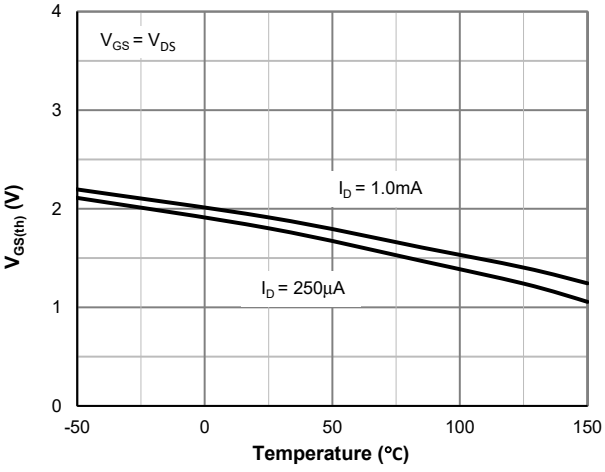


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

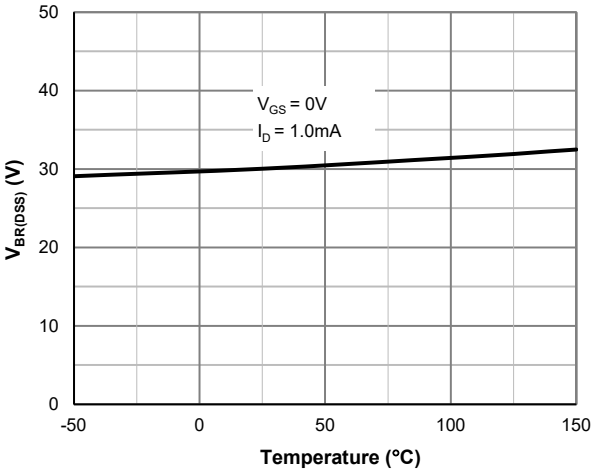


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics - Q1

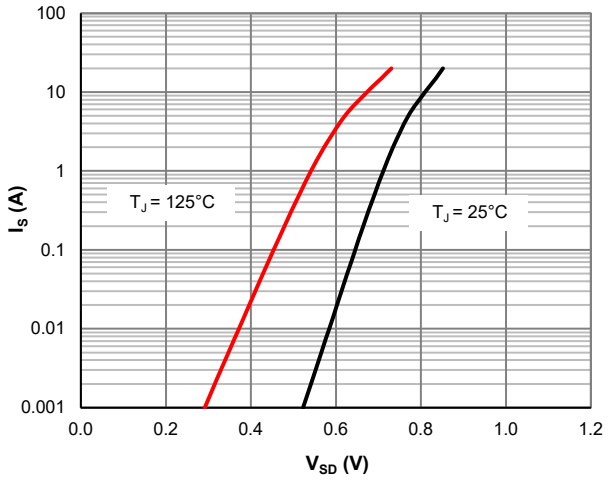


Figure 7: Body-Diode Characteristics

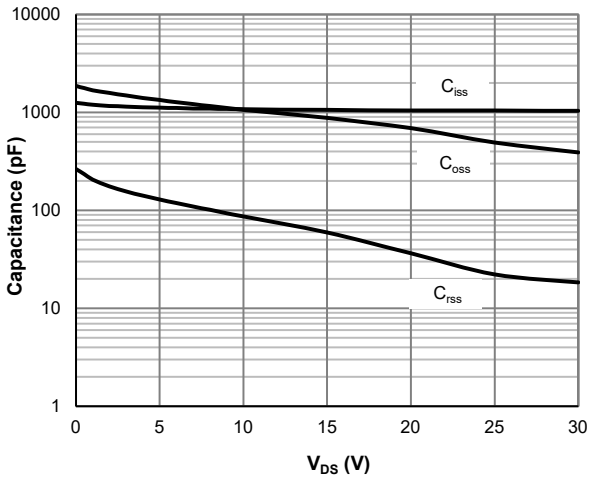


Figure 8: Capacitance Characteristics

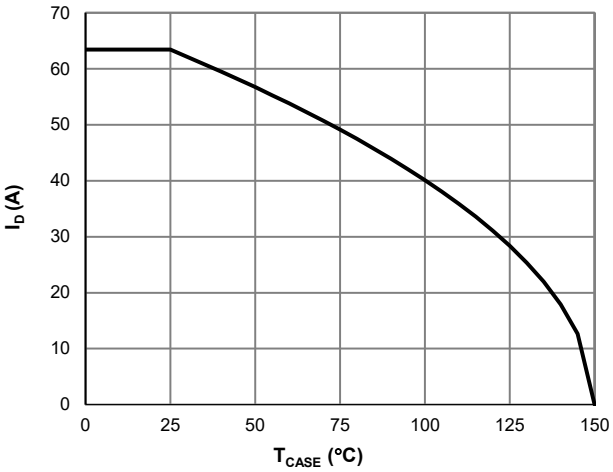


Figure 9: Current De-rating

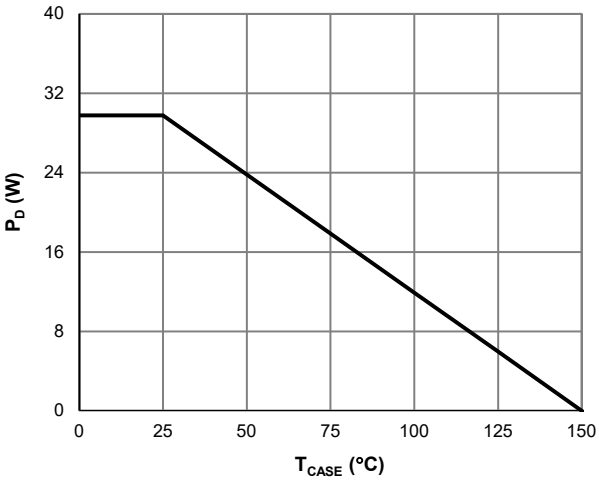


Figure 10: Power De-rating

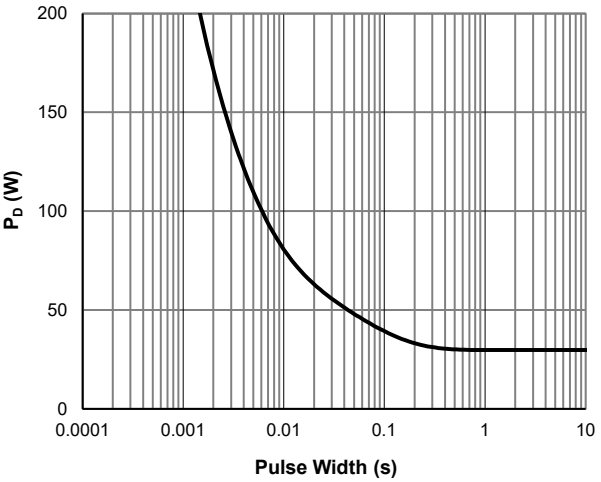


Figure 11: Single Pulse Power Rating, Junction-to-Case

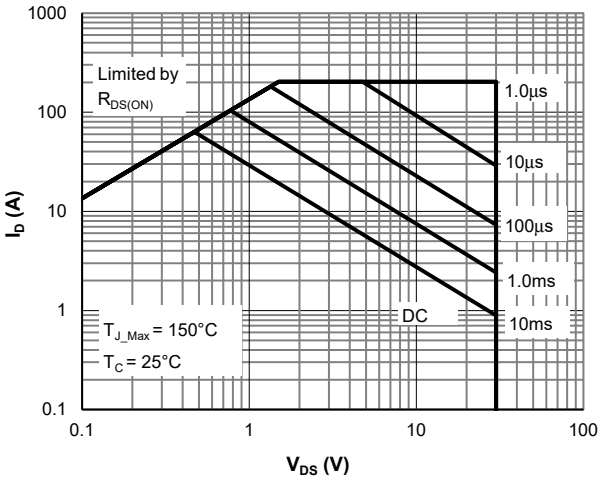


Figure 12: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics - Q1

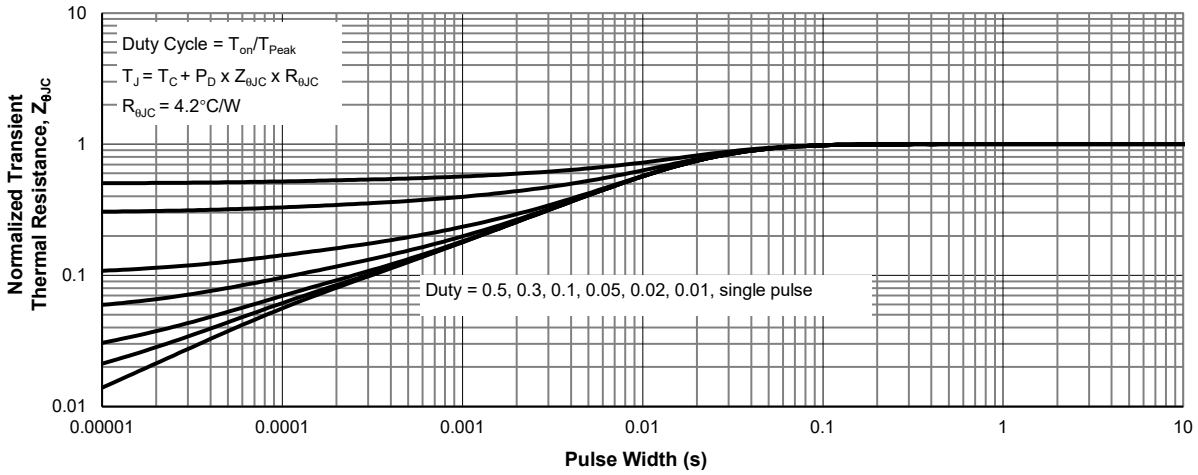


Figure 13: Normalized Maximum Transient Thermal Impedance

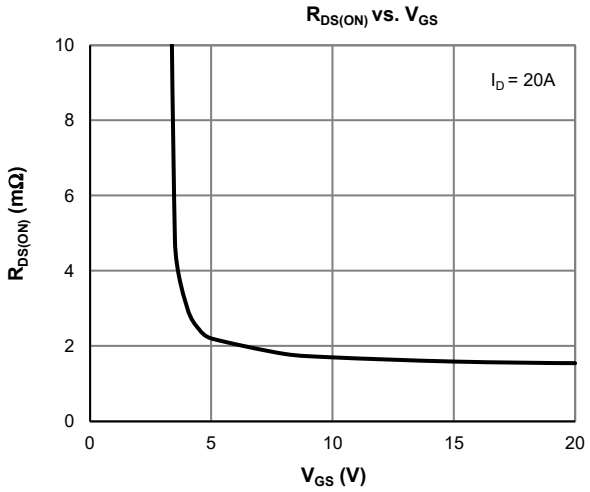
Electrical Characteristics - Q2 (@ T_J = 25°C unless otherwise specified)

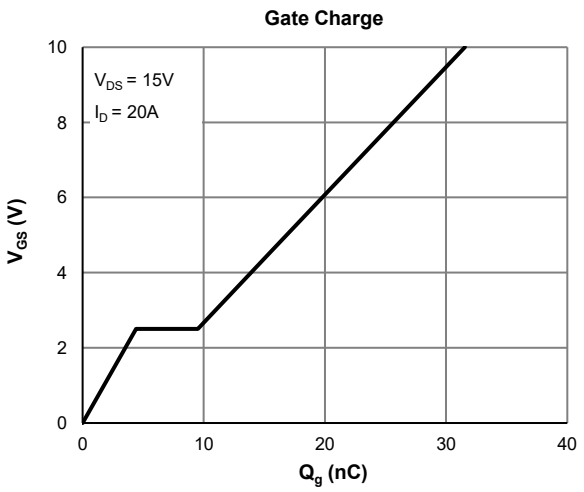
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 1.0mA, V_{GS} = 0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V			1.0	µA
		T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±12V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	1.2	1.7	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		1.7	2.1	mΩ
		V_{GS} = 4.5V, I_D = 15A		2.6	3.3	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		95		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.7	1.0	V
Diode Continuous Current	I_S	T_C = 25°C			30	A
DYNAMIC PARAMETERS [6]						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz		2091		pF
Output Capacitance	C_{oss}			1539		pF
Reverse Transfer Capacitance	C_{rss}			147		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.5		Ω
SWITCHING PARAMETERS [6]						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 15V, I_D = 20A		32		nC
Total Gate Charge (@ V_{GS} = 4.5V)	Q_g			15.4		nC
Gate Source Charge	Q_{gs}			4.4		nC
Gate Drain Charge	Q_{gd}			5.1		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 15V R_L = 0.75Ω, R_{GEN} = 3Ω		6.2		ns
Turn-On Rise Time	t_r			7.8		ns
Turn-Off DelayTime	$t_{D(off)}$			35		ns
Turn-Off Fall Time	t_f			20		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 100A/µs		40		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/µs		35		nC

Notes:

5. The power dissipation P_D is based on additional heatsinking and the maximum allowed junction temperature of 150°C.

6. This value is guaranteed by design hence it is not included in the production test.





Typical Electrical & Thermal Characteristics - Q2

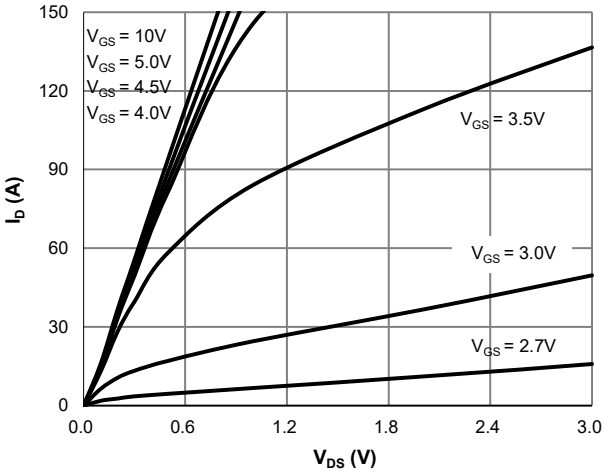


Figure 1: Saturation Characteristics

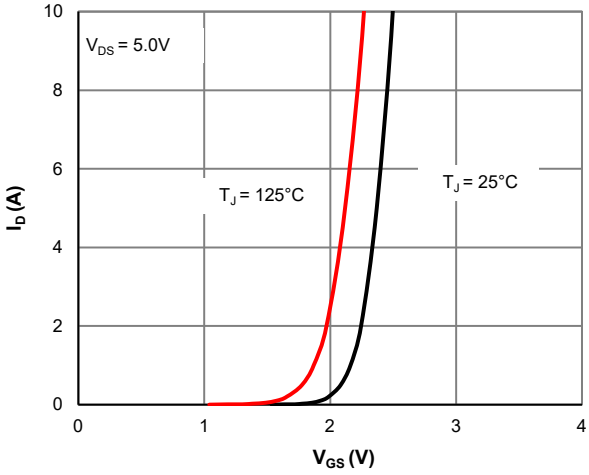


Figure 2: Transfer Characteristics

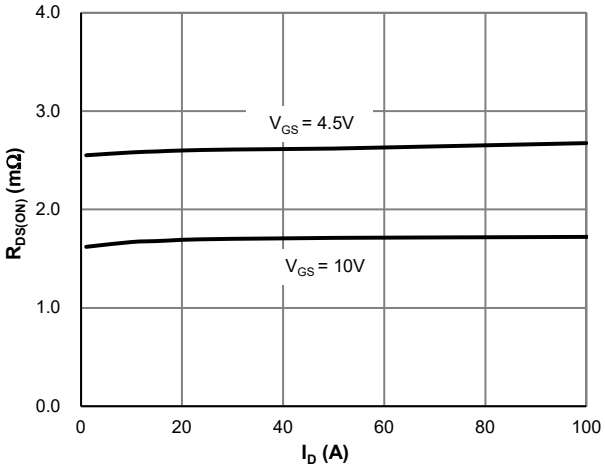


Figure 3: $R_{DS(ON)}$ vs. Drain Current

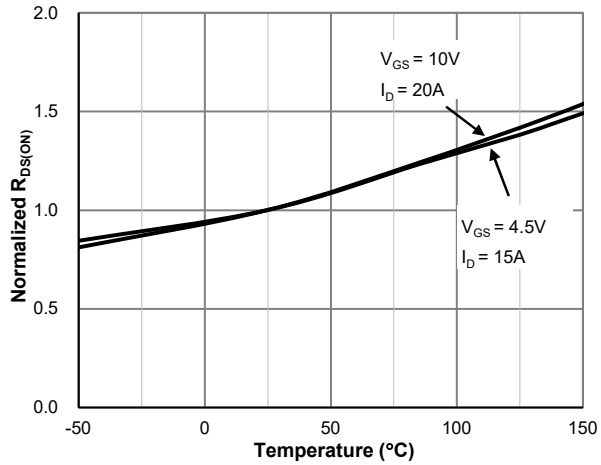


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

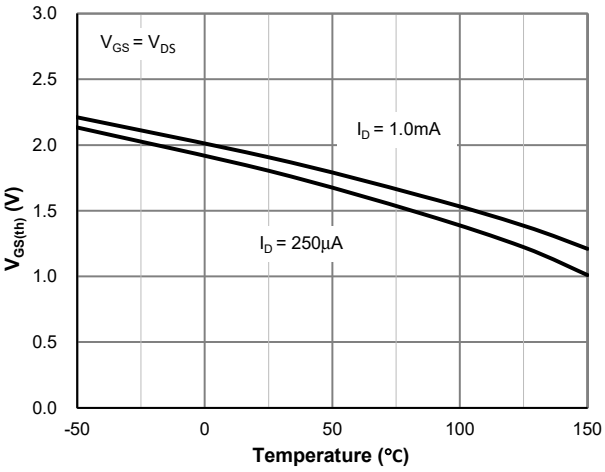


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

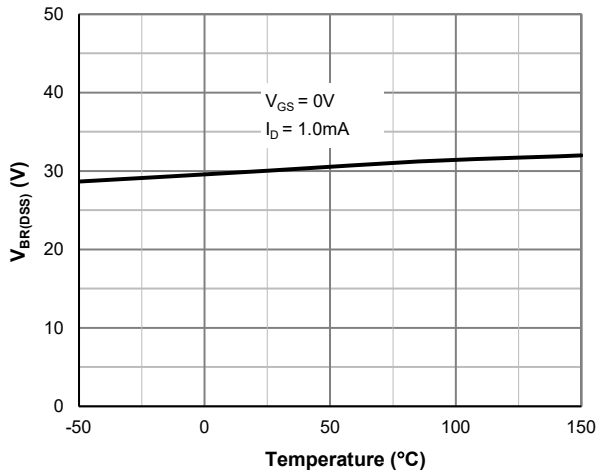


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics - Q2

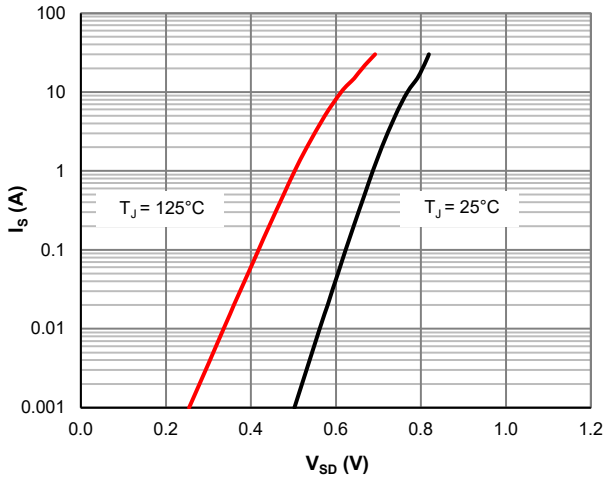


Figure 7: Body-Diode Characteristics

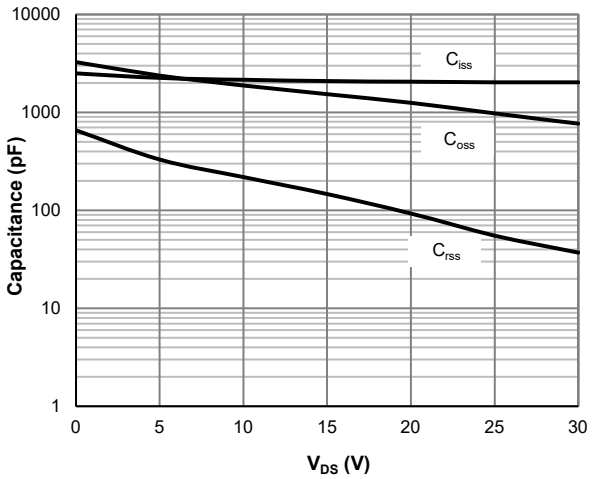


Figure 8: Capacitance Characteristics

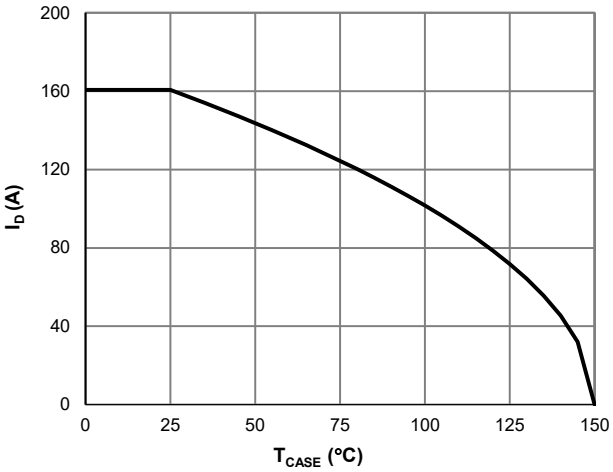


Figure 9: Current De-rating

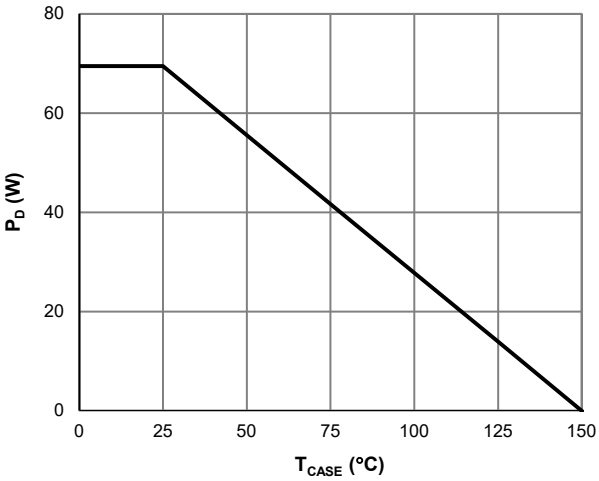


Figure 10: Power De-rating

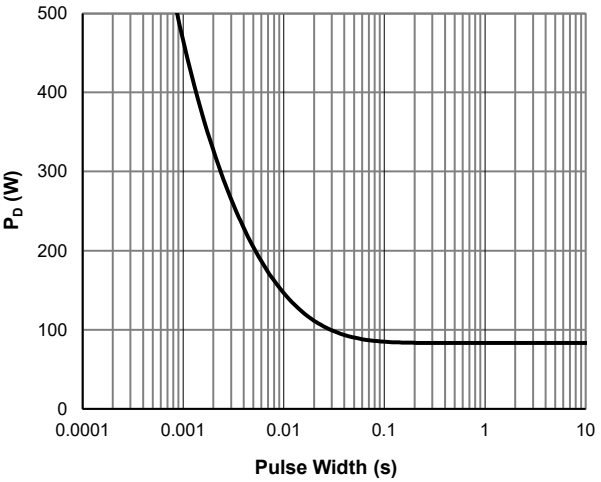


Figure 11: Single Pulse Power Rating, Junction-to-Case

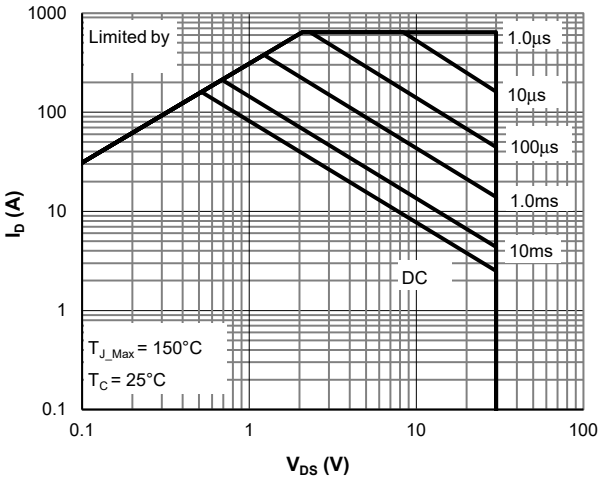


Figure 12: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics - Q2

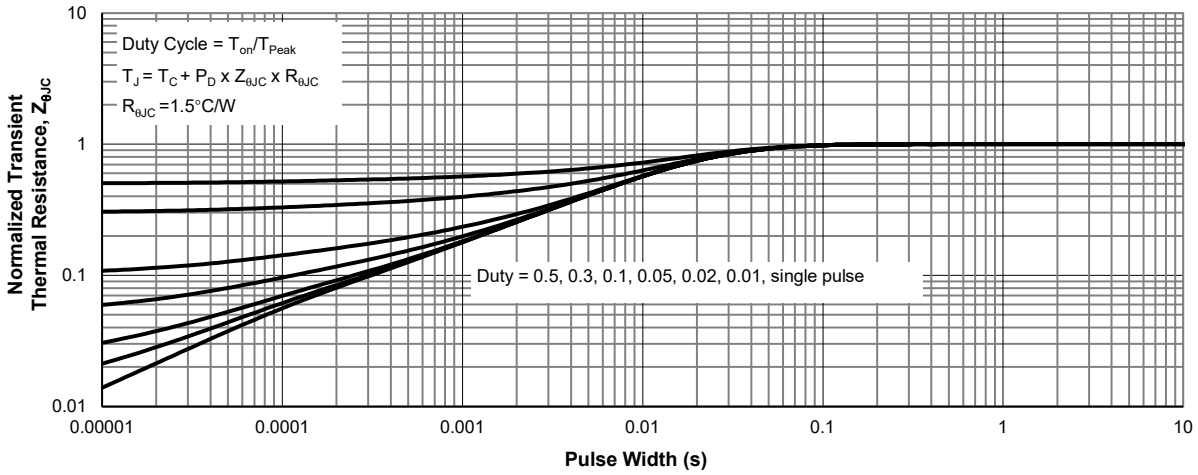
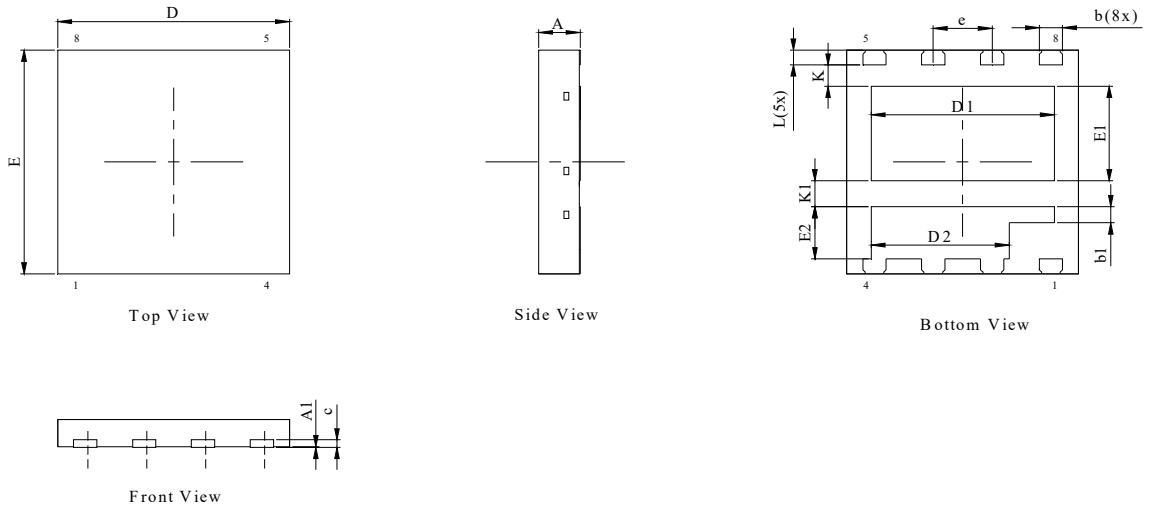


Figure 13: Normalized Maximum Transient Thermal Impedance

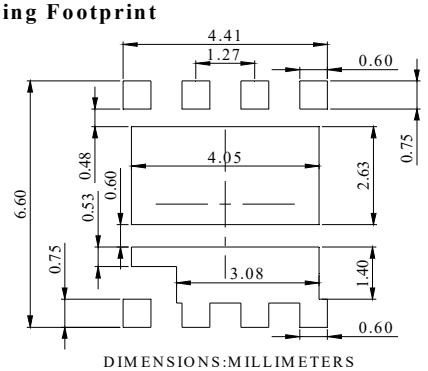
DFN5060-8L-C Package Information

Package Outlines



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	--	--	0.05
b	0.45	0.50	0.55
b1	0.33	0.43	0.53
c	--	0.20	--
D	4.90	5.00	5.10
D1	3.85	3.95	4.05
D2	2.88	2.98	3.08
E	5.90	6.00	6.10
E1	2.43	2.53	2.63
E2	1.30	1.40	1.50
L	0.30	0.40	0.50
K	0.58		
K1	0.70		
e	1.27 BSC		

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS