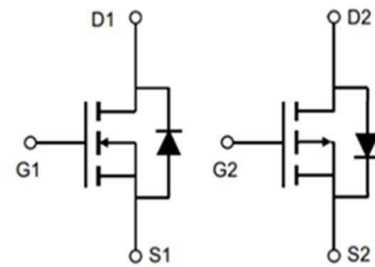




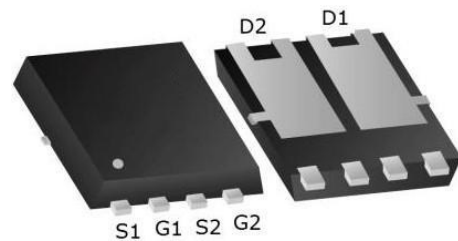
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Description

The WLQ30G30F is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications. The WLQ30G30F meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.



### PDFN5060-8L Pin Configuration



### Product Summary

BVDSS	R <sub>DS(on)</sub>	I <sub>D</sub>
30V	9.5mΩ	30A
-30V	16mΩ	-30A

### Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V <sub>DS</sub>	Drain-Source Voltage	30	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	±20	V
I <sub>D</sub> @Ta=25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	30	-30	A
I <sub>D</sub> @Ta=100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	15	-16	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	46	-40	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	28	66	mJ
P <sub>D</sub> @Tc=25°C	Total Power Dissipation <sup>4</sup>	15	21.3	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	48	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	5	°C/W



### N-Channel Electrical Characteristics $T = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(on)}$ <small>note3</small>	Static Drain-Source on-Resistance	$V_{GS}=10V, I_D=10A$	-	9.5	13	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	16	22.5	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	633	-	pF
$C_{oss}$	Output Capacitance		-	120	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	99	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=10A,$ $V_{GS}=10V$	-	15	-	nC
$Q_{gs}$	Gate-Source Charge		-	4.7	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	3.6	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=30V, I_D=18A,$ $R_{GEN}=3\Omega, V_{GS}=10V$	-	5	-	ns
$t_r$	Turn-on Rise Time		-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	21	-	ns
$t_f$	Turn-off Fall Time		-	7	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	30	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	72	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=18A$	-	-	1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=18A, di/dt=100A/\mu s$	-	7	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	5.9	-	nC

Note :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=20A$
4. The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



### P-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA	-30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V	-	-	-1	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-1.6	-2.5	V
R <sub>DS(on)</sub> <small>note3</small>	Static Drain-Source on-Resistance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A	-	16	25	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A	-	25	40	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V, f=1.0MHz	-	1240	-	pF
C <sub>oss</sub>	Output Capacitance		-	151	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	138	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A, V <sub>GS</sub> = -10V	-	24	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.7	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	4.8	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = -15V, I <sub>D</sub> = -10A, V <sub>GS</sub> = -10V, R <sub>GEN</sub> =3Ω	-	11	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	5.5	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	3.5	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	4.6	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	-30	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> = -10A	-	-	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

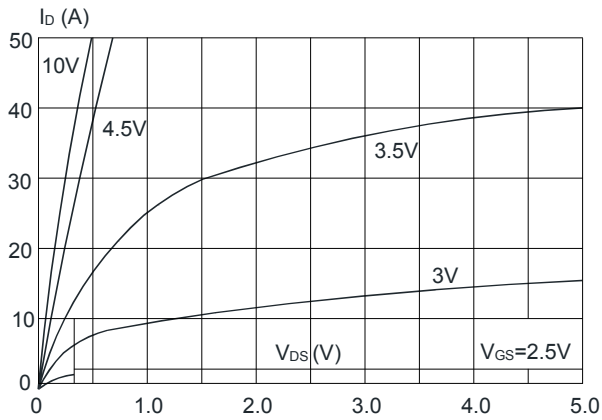
2. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=-15V, V<sub>G</sub>=-10V, R<sub>G</sub>=25Ω, L=0.1mH, I<sub>AS</sub>= -27A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

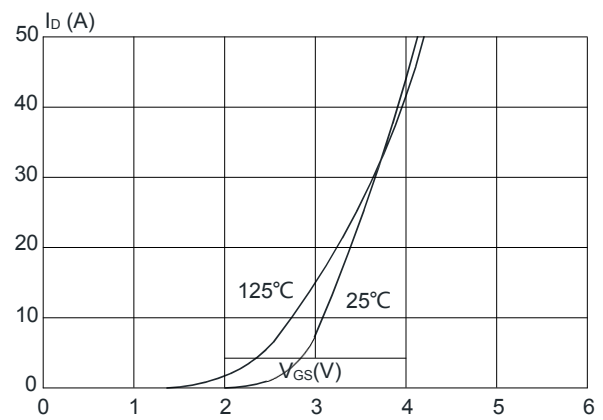


### Typical Performance Characteristics-N

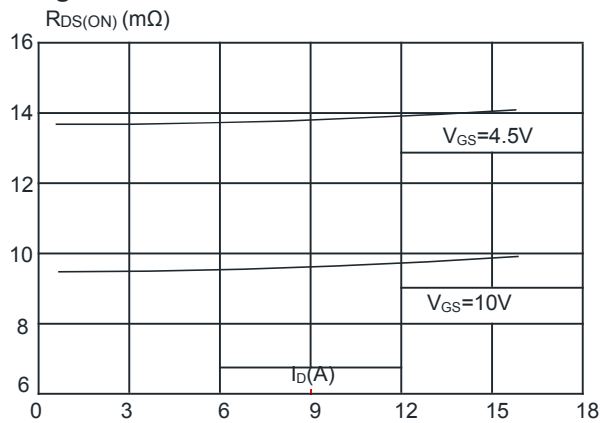
**Figure 1:** Output Characteristics



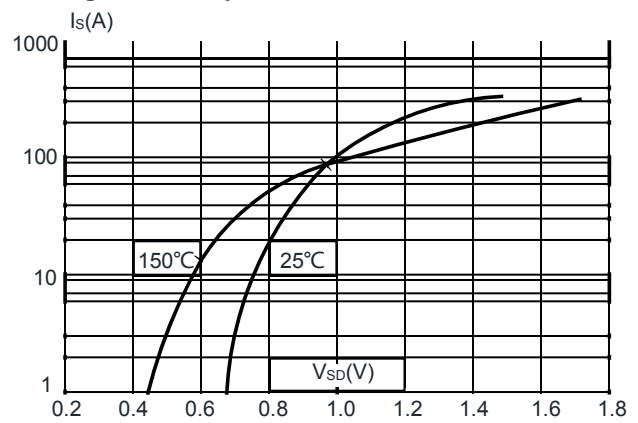
**Figure 2:** Typical Transfer Characteristics



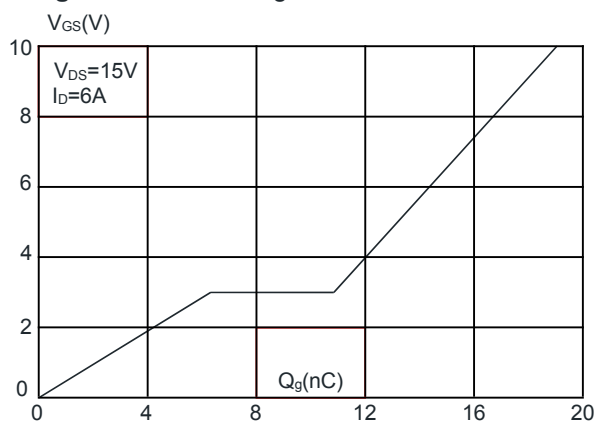
**Figure 3:** On-resistance vs. Drain Current



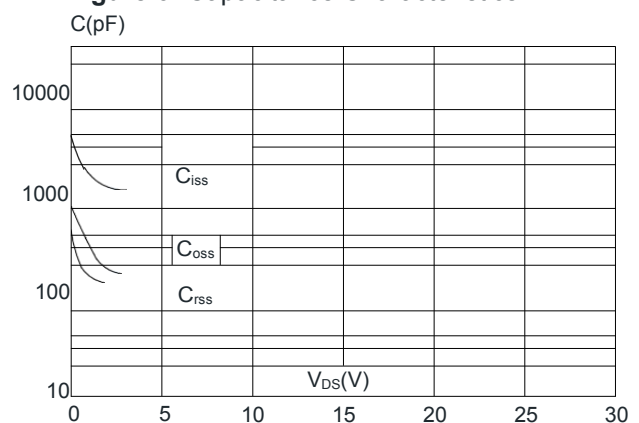
**Figure 4:** Body Diode Characteristics



**Figure 5:** Gate Charge Characteristics



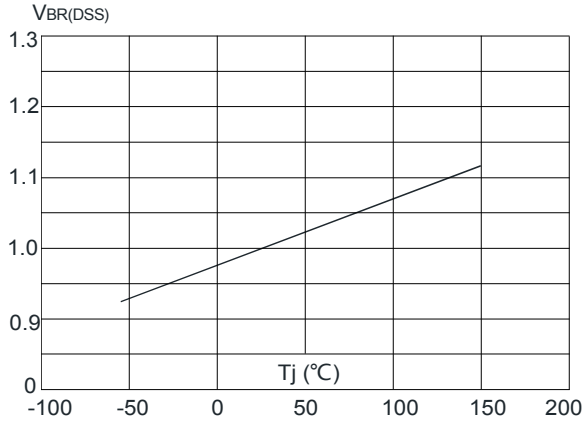
**Figure 6:** Capacitance Characteristics



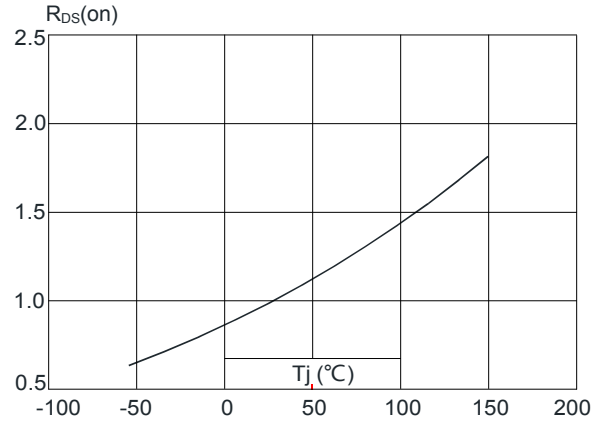


## N-Ch and P-Ch Fast Switching MOSFETs

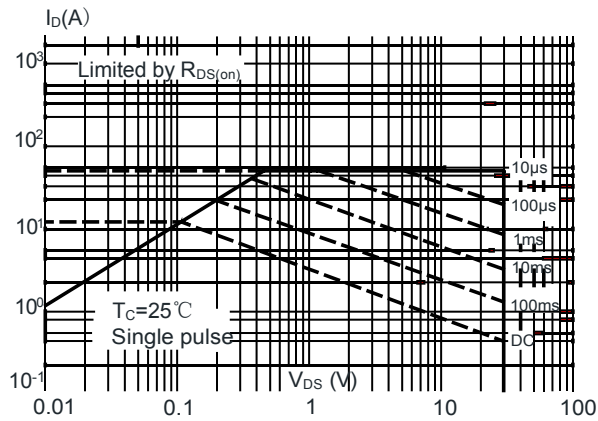
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



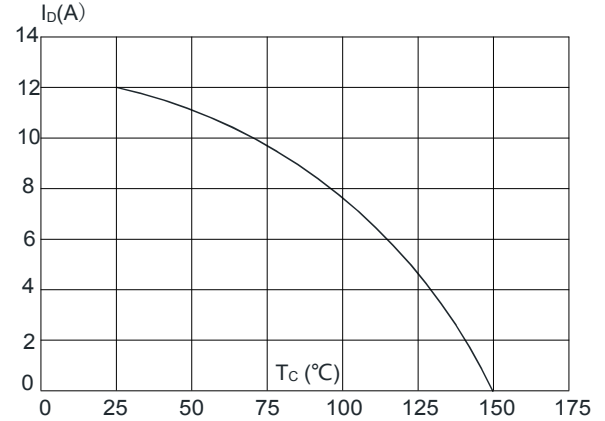
**Figure 8:** Normalized on Resistance vs. Junction Temperature



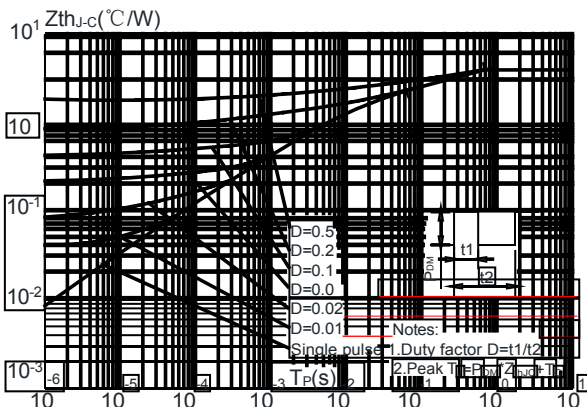
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case





### Test Circuit-N

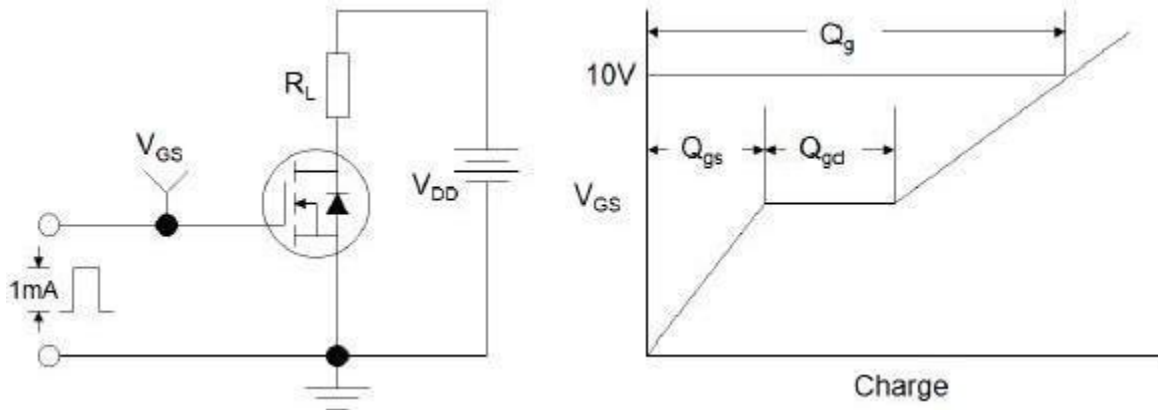


Figure1:Gate Charge Test Circuit & Waveform

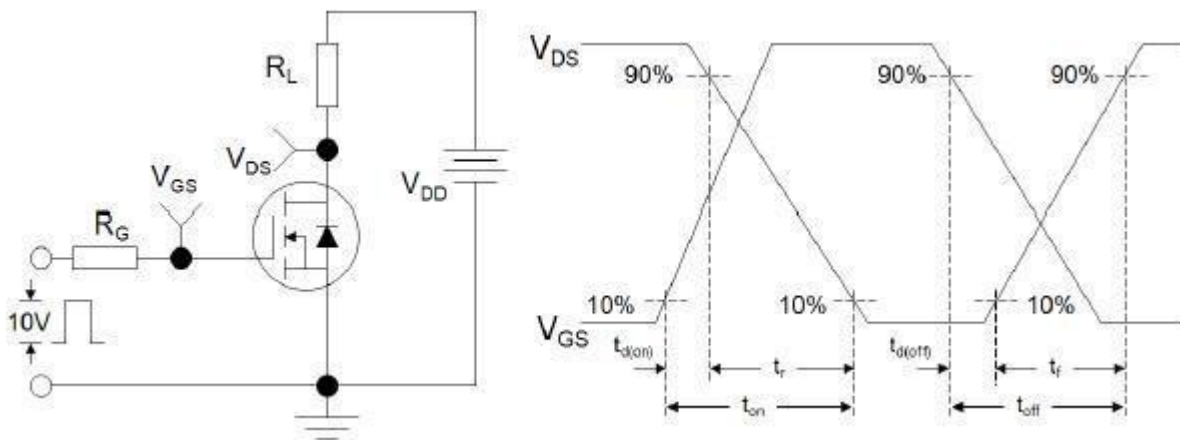


Figure 2: Resistive Switching Test Circuit & Waveforms

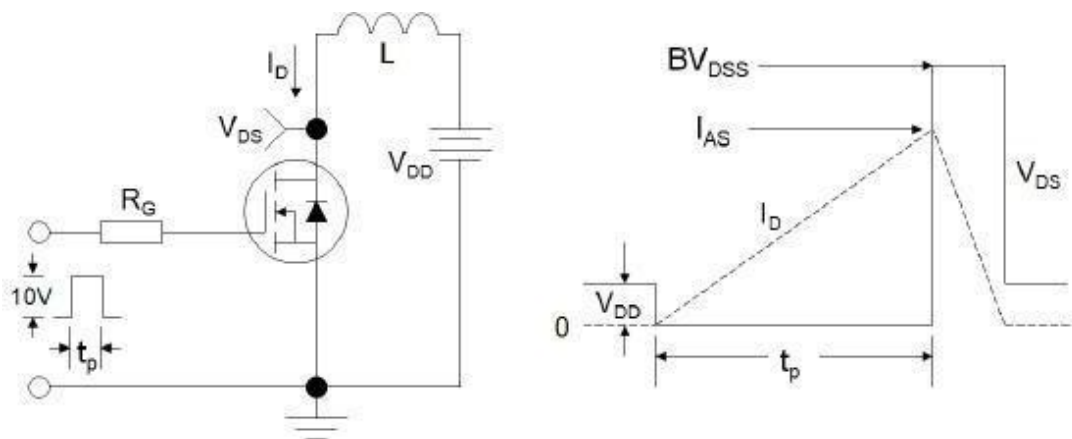
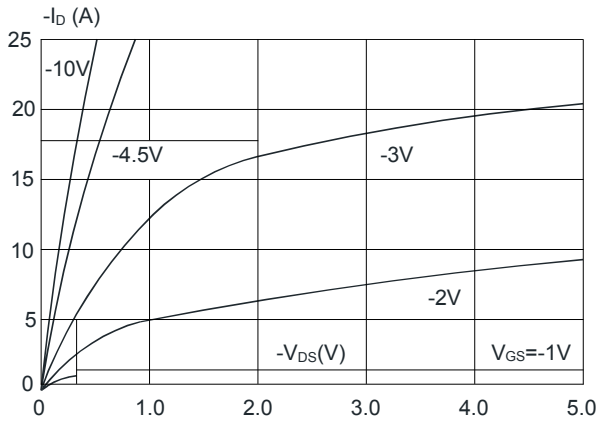


Figure 3:Unclamped Inductive Switching Test Circuit & Waveform

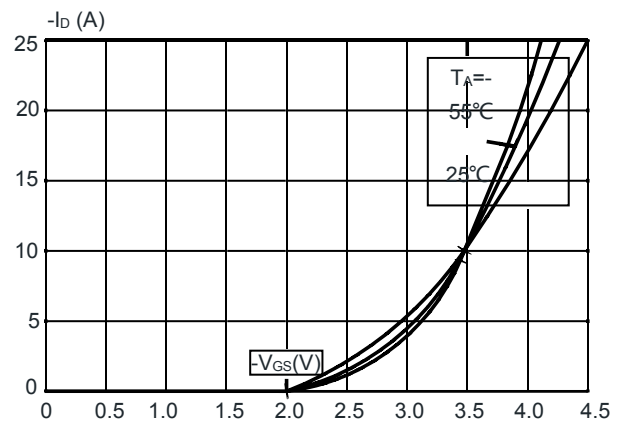


### Typical Performance Characteristics-P

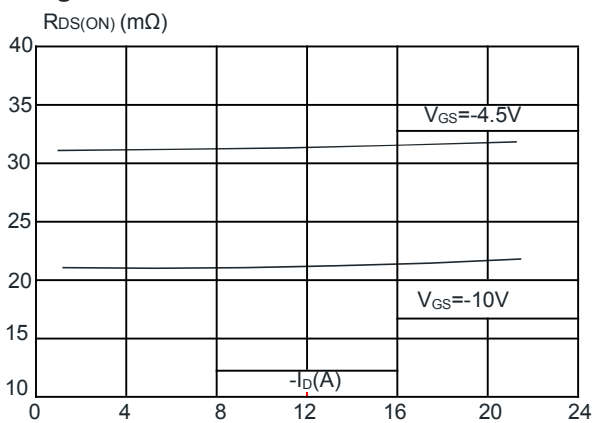
**Figure 1: Output Characteristics**



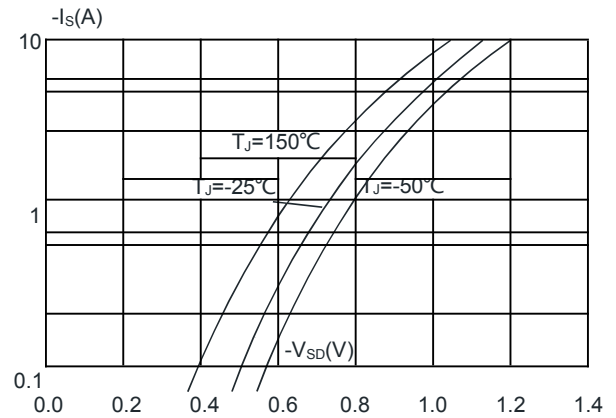
**Figure 2: Typical Transfer Characteristics**



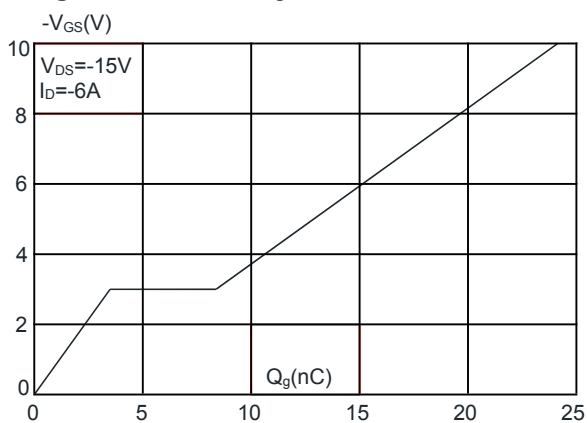
**Figure 3: On-resistance vs. Drain Current**



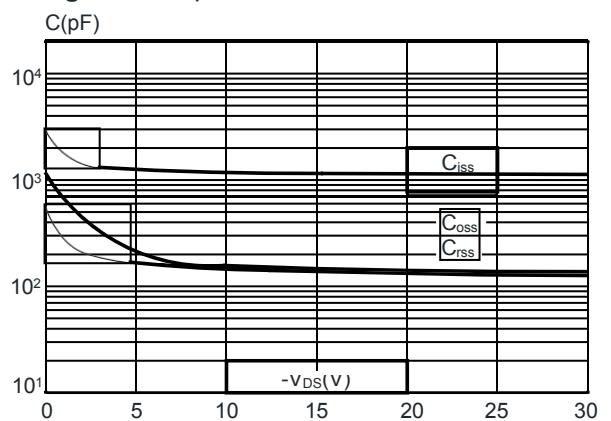
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



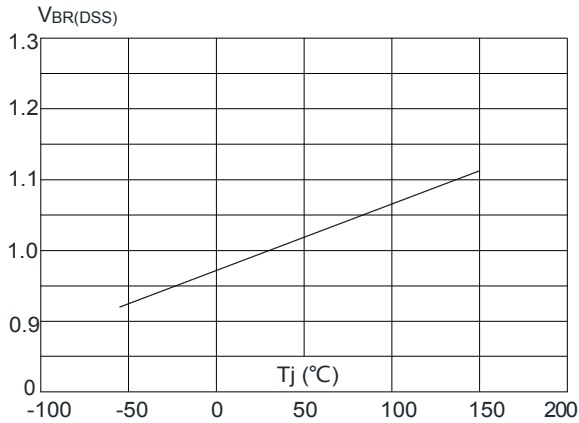
**Figure 6: Capacitance Characteristics**



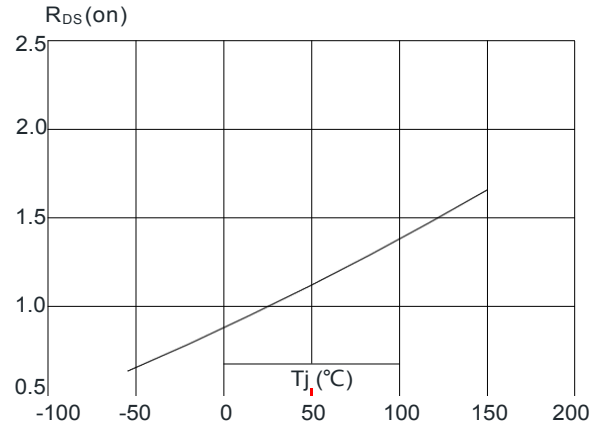


## N-Ch and P-Ch Fast Switching MOSFETs

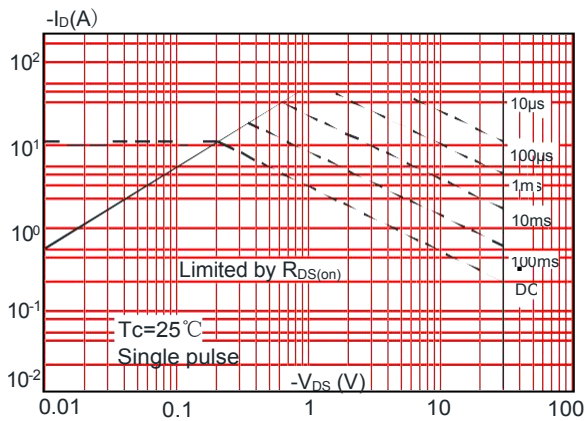
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



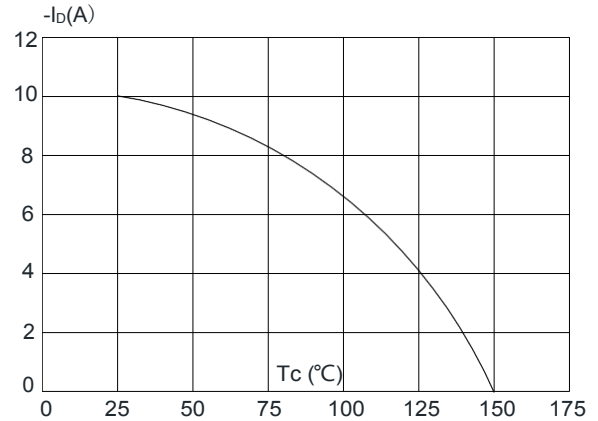
**Figure 8:** Normalized on Resistance vs. Junction Temperature



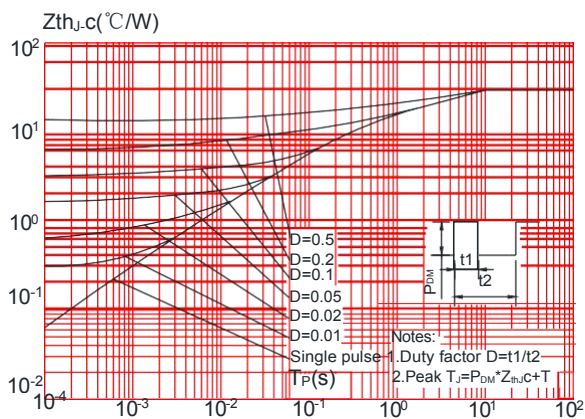
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



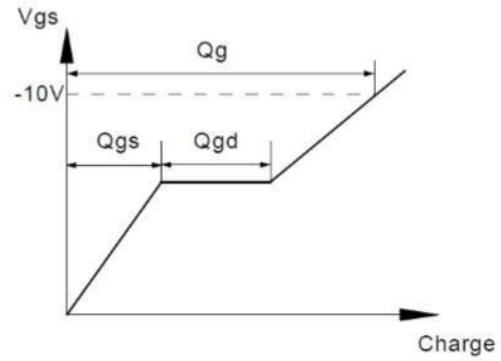
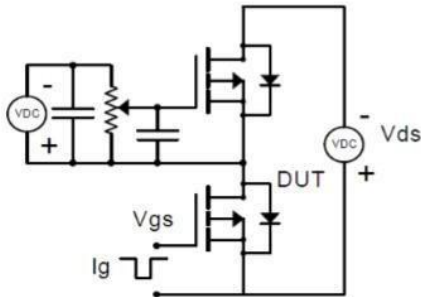
**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



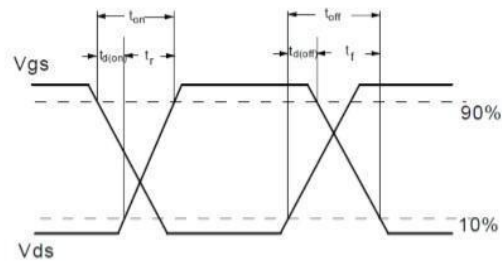
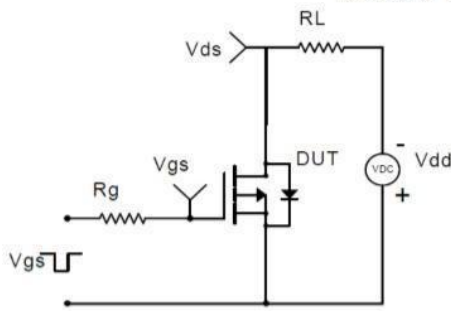


### Test Circuit-P

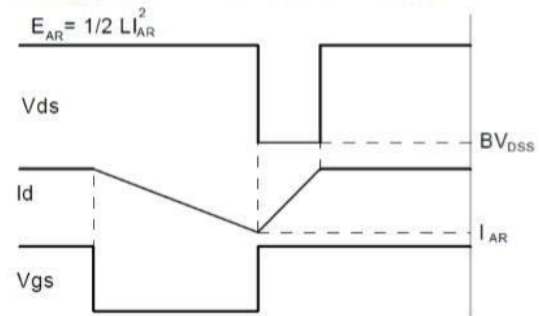
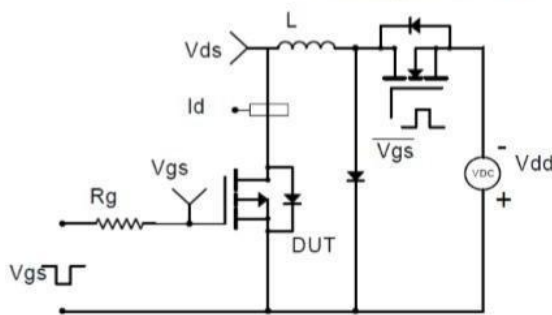
Gate Charge Test Circuit & Waveform



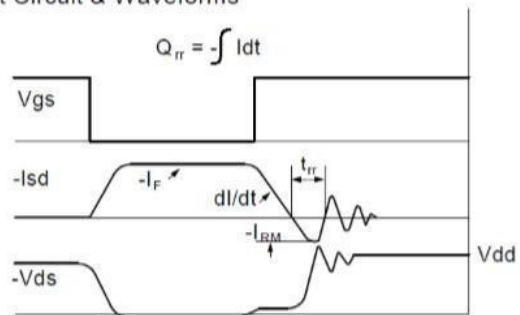
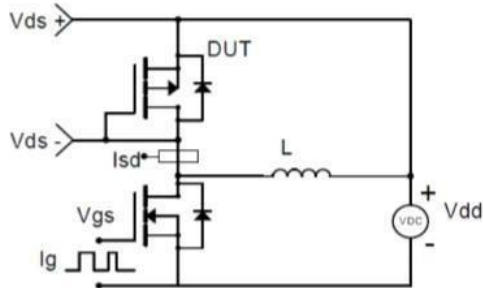
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

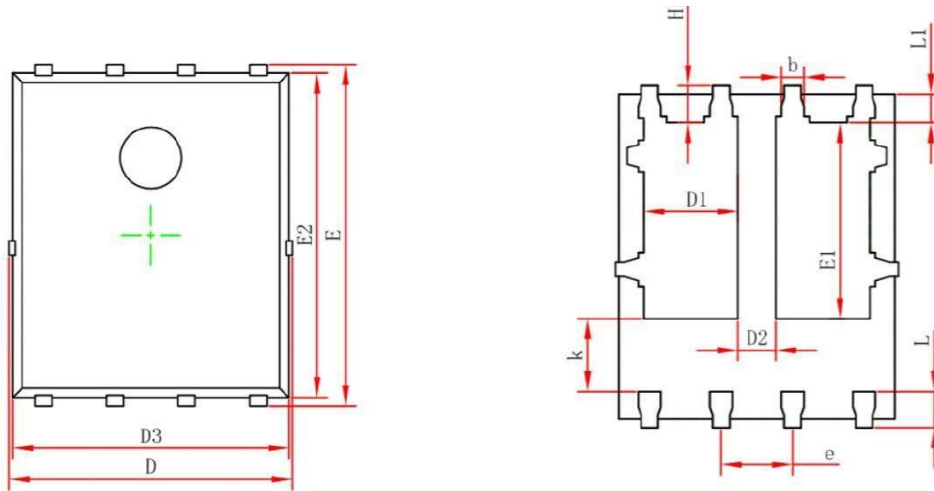


Diode Recovery Test Circuit & Waveforms



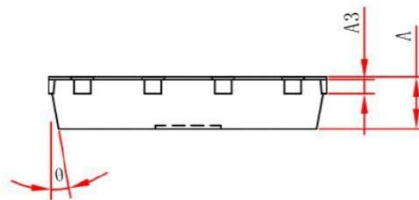


Package Mechanical Data- PDFN5060-8L



**Top View**

**Bottom View**



**Side View**

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°



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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.