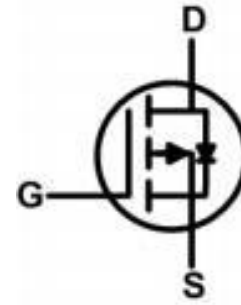




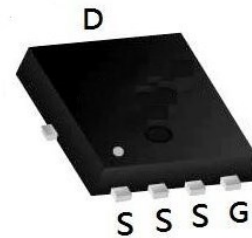
- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology



### Description

The WLQ60P04F is the high cell density trenched P-ch MOSFETs, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications. The WLQ60P04F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### PDFN5060-8L Pin Configuration



### Product Summary

<b>BVDSS</b>	<b>R<sub>DS(on)</sub></b>	<b>I<sub>D</sub></b>
-40V	6.4mΩ	-60A

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		<b>V<sub>DS</sub></b>	-40	V
Gate-Source Voltage		<b>V<sub>GS</sub></b>	±20	V
Continuous Drain Current	T <sub>c</sub> =25°C	<b>I<sub>D</sub></b>	-60	A
	T <sub>c</sub> =100°C		-50.6	
Pulsed Drain Current <sup>1</sup>		<b>I<sub>DM</sub></b>	-320	A
Single Pulse Avalanche Energy <sup>2</sup>		<b>EAS</b>	101.25	mJ
Total Power Dissipation	T <sub>c</sub> =25°C	<b>P<sub>D</sub></b>	81.16	W
Operating Junction and Storage Temperature Range		<b>T<sub>J</sub> , T<sub>STG</sub></b>	-55 to 150	°C

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient <sup>3</sup>	<b>R<sub>θJA</sub></b>	54	°C/W
Thermal Resistance from Junction-to-Case	<b>R<sub>θJC</sub></b>	1.54	°C/W



### Electrical Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static Characteristics</b>							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40	-	-	V	
Gate-body Leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -40V, V_{GS} = 0V$	$T_J = 25^\circ\text{C}$	-	-	-1	pA
			$T_J = 100^\circ\text{C}$	-	-	-100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.6	-2.5	V	
Drain-Source on-Resistance <sup>4</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -20A$	-	6.4	8.2	m $\Omega$	
		$V_{GS} = -4.5V, I_D = -15A$	-	8.2	11		
Forward Transconductance <sup>4</sup>	$g_{fs}$	$V_{DS} = -10V, I_D = -20A$	-	104	-	S	
<b>Dynamic Characteristics<sup>5</sup></b>							
Input Capacitance	$C_{iss}$	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$	-	5295	-	pF	
Output Capacitance	$C_{oss}$		-	430	-		
Reverse Transfer Capacitance	$C_{rss}$		-	385	-		
Gate Resistance	$R_g$	$f = 1MHz$	-	4.3	-	Q	
<b>Switching Characteristics<sup>5</sup></b>							
Total Gate Charge	$Q_g$	$V_{GS} = -10V, V_{DS} = -20V, I_D = -20A$	-	110	-	nC	
Gate-Source Charge	$Q_{gs}$		-	12.5	-		
Gate-Drain Charge	$Q_{gd}$		-	23	-		
Turn-on Delay Time	$t_{d(on)}$	$V_{GS} = -10V, V_{DD} = -20V, R_G = 3\Omega, I_D = -20A$	-	16.8	-	ns	
Rise Time	$t_r$		-	10	-		
Turn-off Delay Time	$t_{d(off)}$		-	65	-		
Fall Time	$t_f$		-	17	-		
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -20A, di/dt = 100A/\mu s$	-	42	-	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	29	-	nC	
<b>Drain-Source Body Diode Characteristics</b>							
Diode Forward Voltage <sup>4</sup>	$V_{SD}$	$I_S = -20A, V_{GS} = 0V$	-	-	-1.2	V	
Continuous Source Current	$I_S$	$T_C = 25^\circ\text{C}$	-	-	-60	A	

Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .
2. The EAS data shows Max. rating . The test condition is  $V_{DD} = -30V, V_{GS} = -10V, L = 0.1mH, I_{AS} = -45A$ .
3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test.



### Typical Characteristics

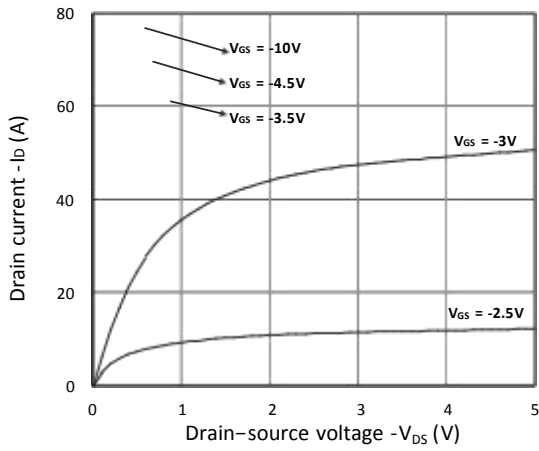


Figure 1. Output Characteristics

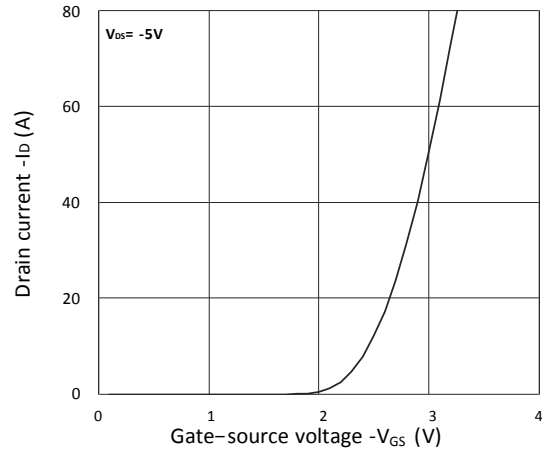


Figure 2. Transfer Characteristics

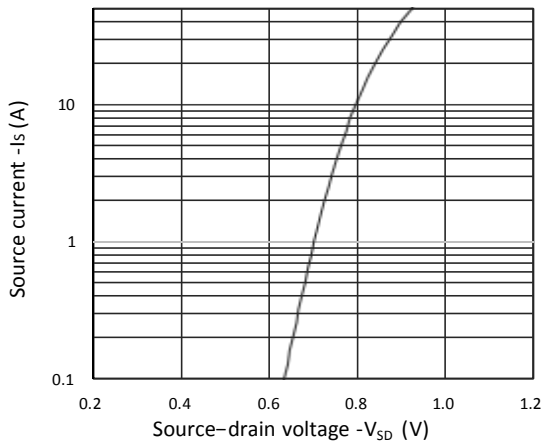


Figure 3. Forward Characteristics of Reverse

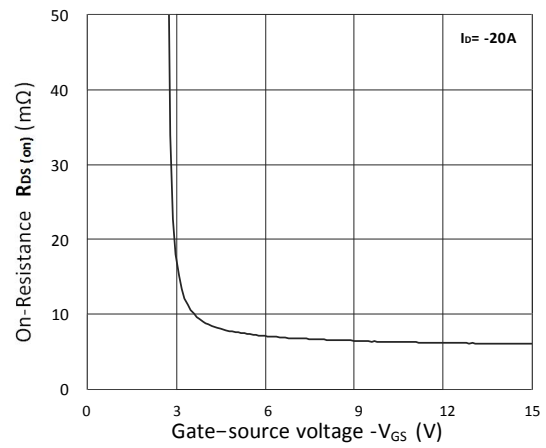


Figure 4.  $R_{DS(ON)}$  vs  $V_{GS}$

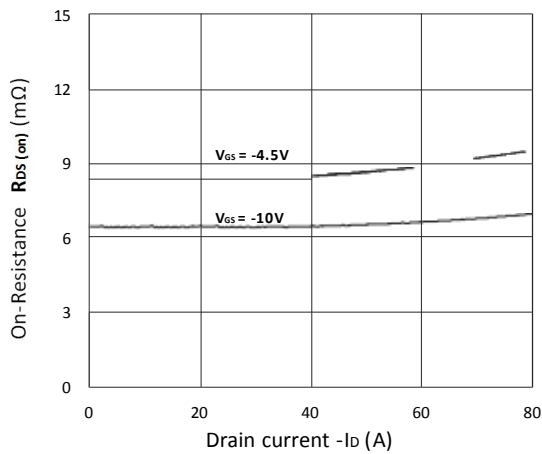


Figure 5.  $R_{DS(ON)}$  vs  $I_D$

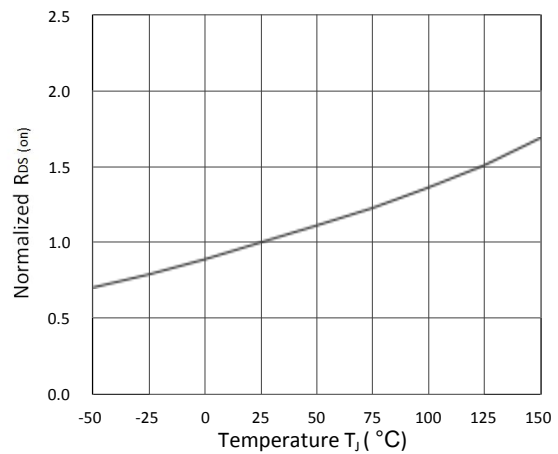


Figure 6. Normalized  $R_{DS(ON)}$  vs Temperature

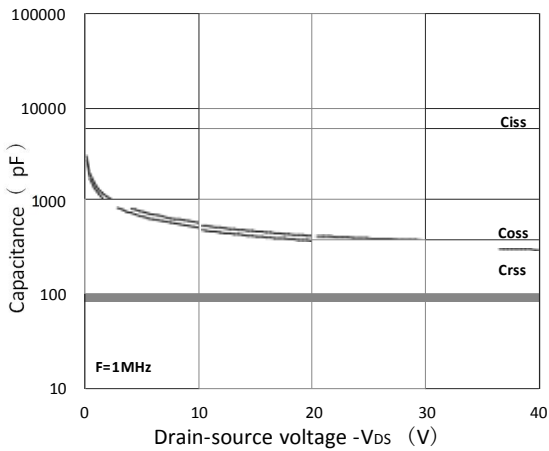


Figure 7. Capacitance Characteristics

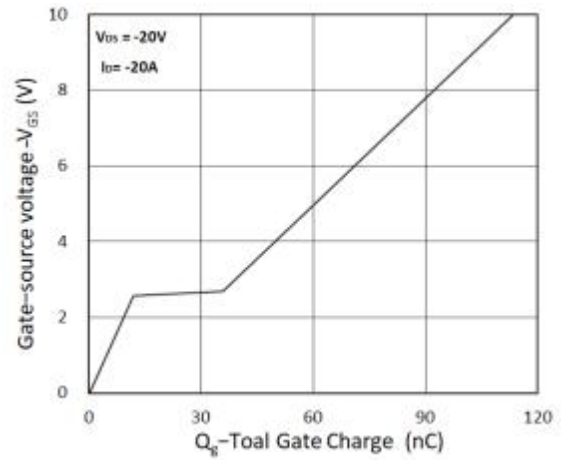


Figure 8. Gate Charge Characteristics

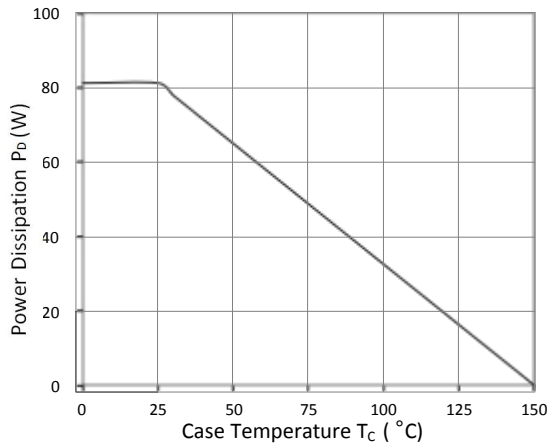


Figure 9. Power Dissipation

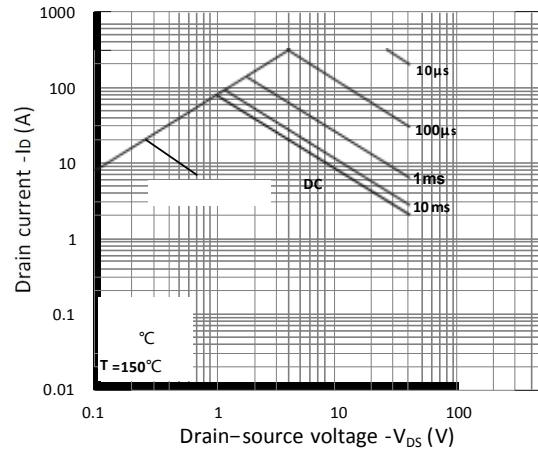


Figure 10. Safe Operating Area

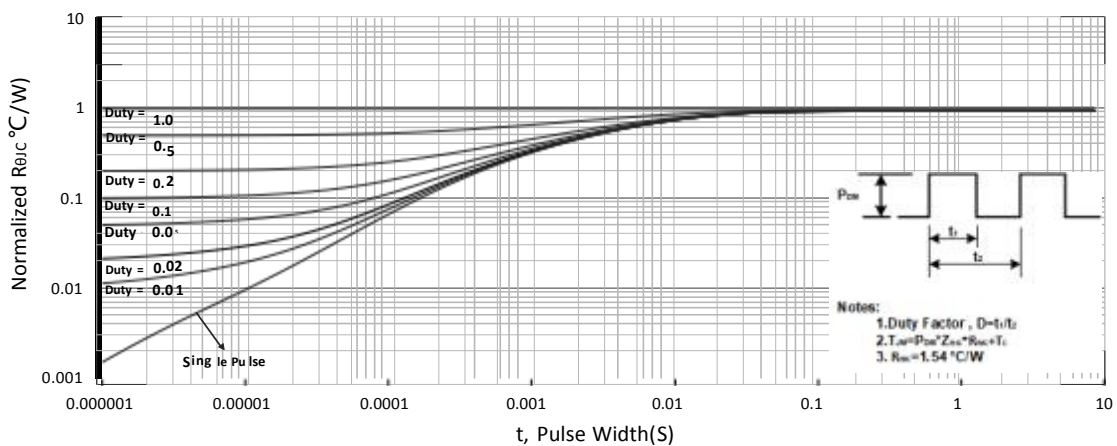
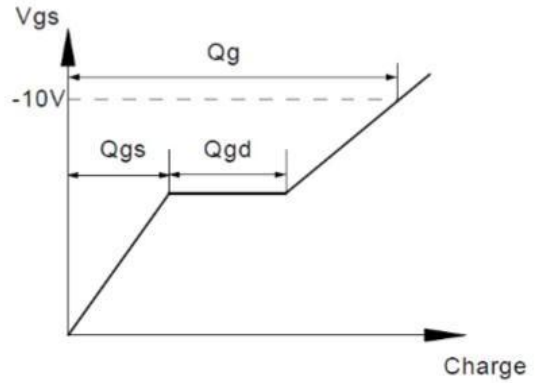
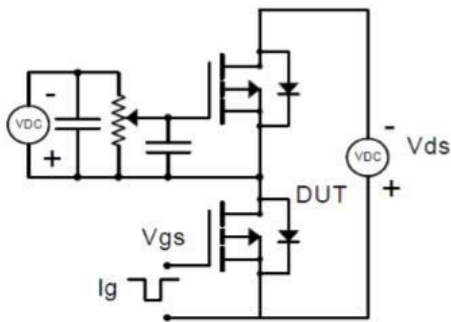


Figure 11. Normalized Maximum Transient Thermal Impedance

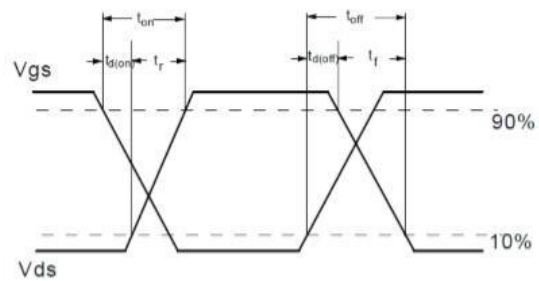
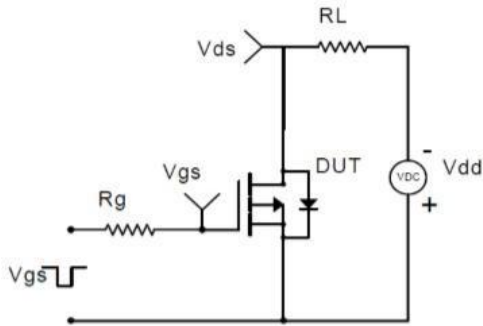


### Test Circuit

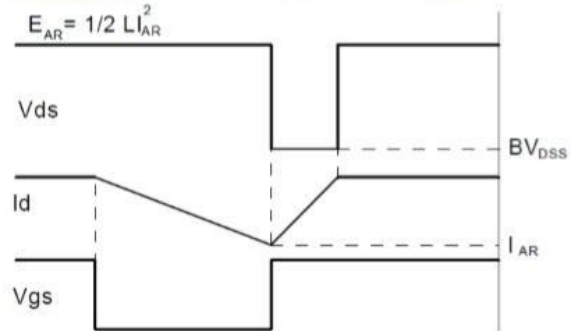
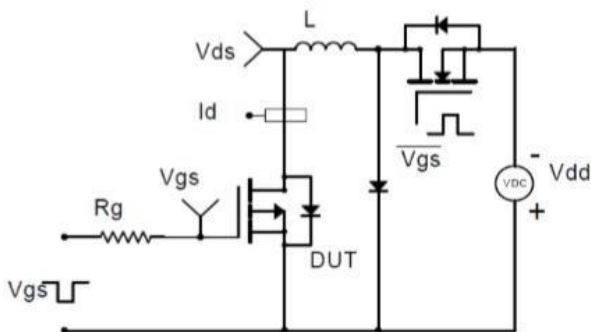
#### Gate Charge Test Circuit & Waveform



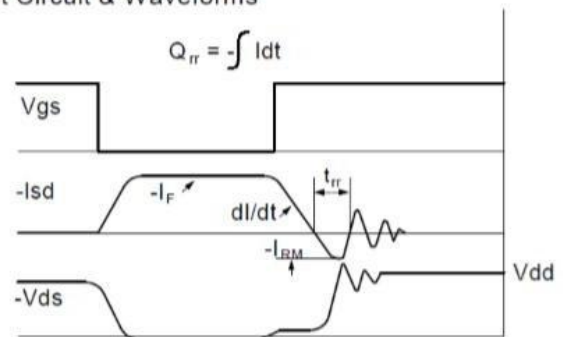
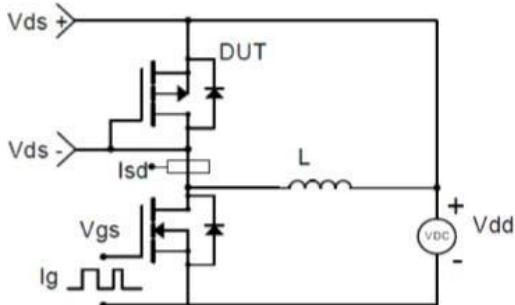
#### Resistive Switching Test Circuit & Waveforms



#### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

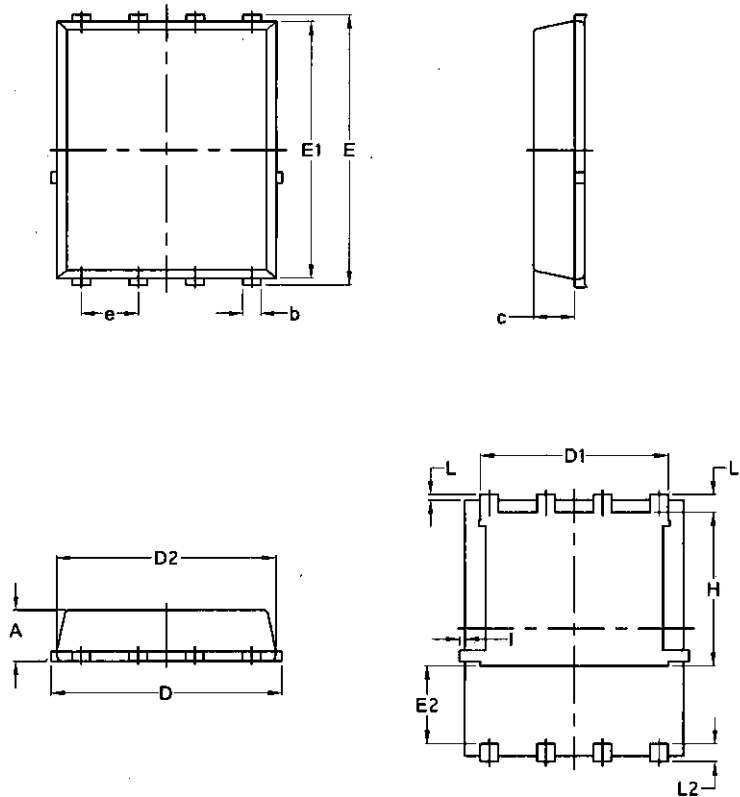


#### Diode Recovery Test Circuit & Waveforms





Package Mechanical Data-PDFN5060-8L Single



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
l	/	0.18	/	0.0070



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