Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

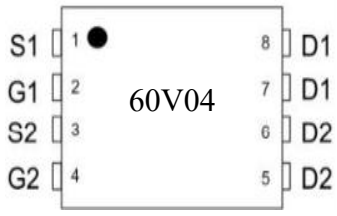
Bvdss	Rdson	ID
40V	6.8mΩ	60A

Application

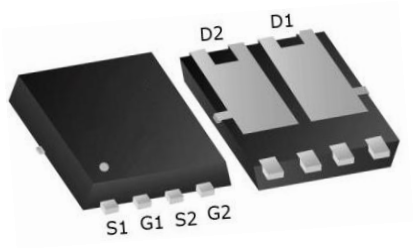
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

RoHS

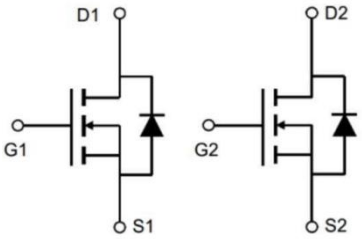
Package



Marking and pin assignment



PDFN5x6-8L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
60V04	S60V04F	PDFN5x6-8L	5000

Absolute Maximum Ratings (T_A=25℃unless otherwise specified)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[1]	T_C=25℃	I_D	60	A
	T_C=100℃		30	A
Pulsed Drain Current[2]		I_{DM}	100	A
Single Pulsed Avalanche Energy[3]		E_{AS}	28	mJ
Avalanche Current		I_{AS}	180	A
Total Power Dissipation		P_D	29	W
Operating Junction Temperature Range		T_J	-55 ~ 150	℃
Storage Temperature Range		T_{STG}	-55 ~ 150	℃

Thermal Resistance Ratings

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance,Junction-to-Case[1]	$R_{\theta JC}$	--	3.2	℃/W
Thermal Resistance,Junction-to-Ambient[1]	$R_{\theta JA}$	--	60	℃/W

Ordering Information

Ordering Number	Package	Pin Assignment						Packing
Halogen Free		G1	G2	D1	D2	S1	S2	
HLS60V04F	PDFN5x6-8L	2	4	7,8	5,6	1	3	Tape Reel

Electrical Characteristics (T_J=25℃,unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	V_{GS}=0V,I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V,V_{GS}=0V	-	-	1	μA
Gate to 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	1.6	2.5	V
Static Drain-Source On-Resistance[3]	$R_{DS(on)}$	V_{GS}=10V, I_D=12A	-	6.8	8.5	mΩ
		V_{GS}=4.5V, I_D=10A	-	10	15	
Input Capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, f=1MHz	-	690	-	pF
Output Capacitance	C_{oss}		-	193	-	
Reverse Transfer Capacitance	C_{rss}		-	38	-	
Total Gate Charge	Q_g	V_{DS}=20V,V_{GS}=4.5V, I_D=12A	-	5.8	-	nC
Gate-Source Charge	Q_{gs}		-	3	-	
Gate-Drain Charge	Q_{gd}		-	1.2	-	
Turn-on Delay Time	$T_{d(on)}$	V_{GS}=10V,V_{DD}=15V, R_G=3.3Ω,I_D=1A	-	14.3	-	nS
Turn-on Rise Time	t_r		-	5.6	-	
Turn-Off Delay Time	$T_{d(off)}$		-	20	-	
Turn-Off Fall Time	T_f		-	11	-	
Body Diode Reverse Recovery Charge	Q_{rr}		-	12	-	
Maximum Continuous Drain to Source Diode Forward Current[1,5]	I_S	V_G=V_{DD}=0V,Force Current	-	-	60	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V,I_S=1A	-	-	1	V

Notes:

1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=31A.

4.The power dissipation is limited by 150℃ 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.

Typical Performance Characteristics

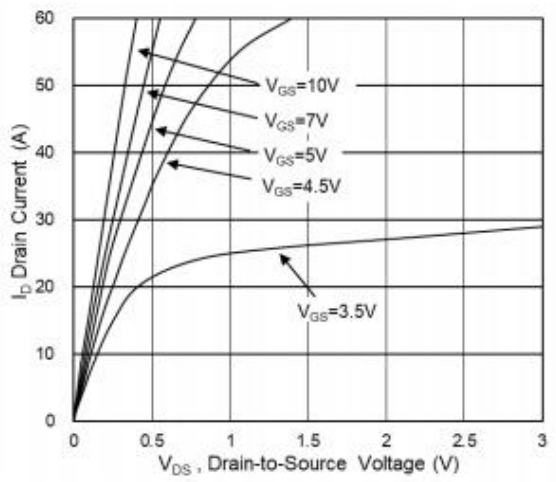


Fig.1 Typical Output Characteristics

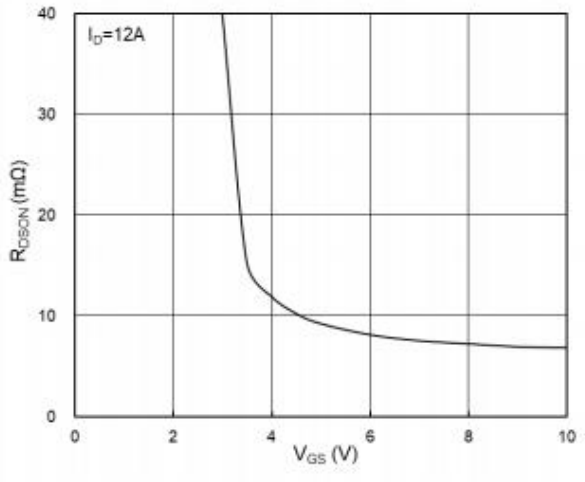


Fig.2 On-Resistance vs G-S Voltage

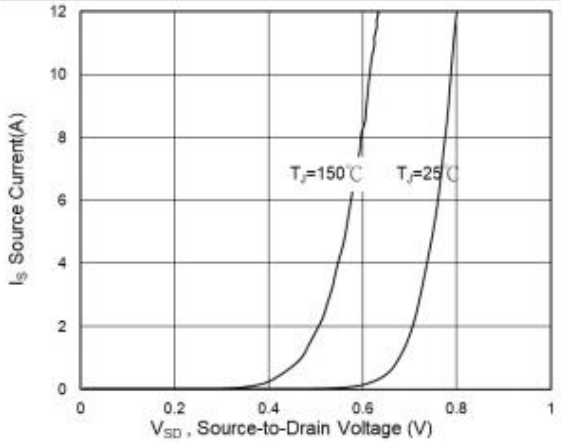


Fig.3 Source Drain Forward Characteristics

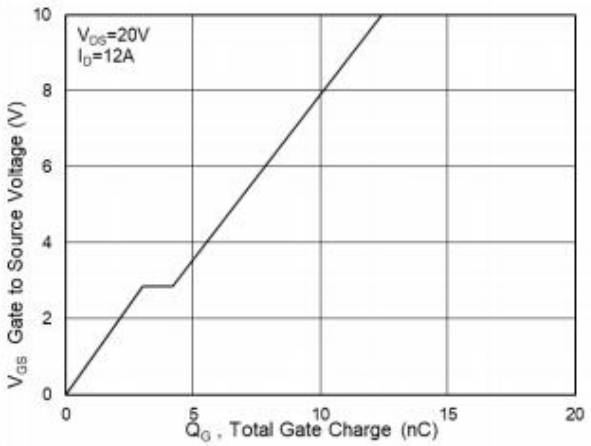


Fig.4 Gate-Charge Characteristics

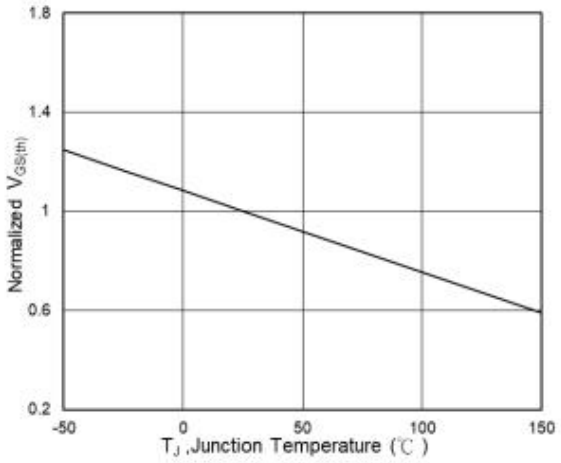


Fig.5 Normalized $V_{GS(th)}$ vs T_J

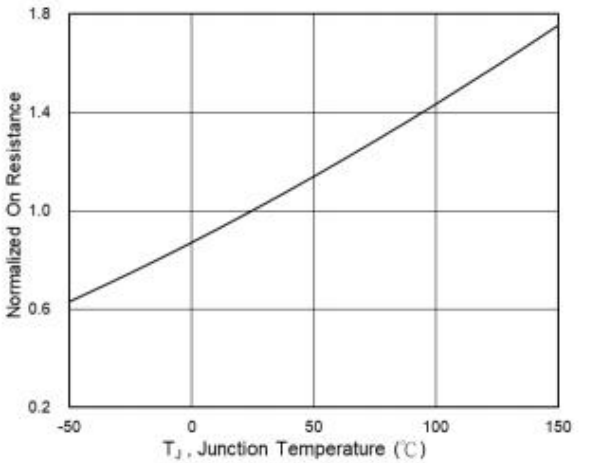


Fig.6 Normalized R_{DSON} vs T_J

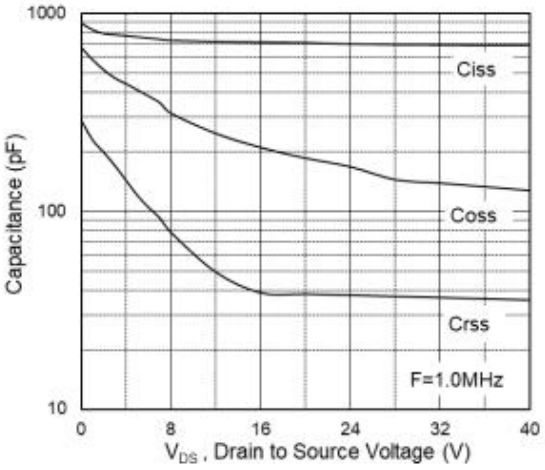


Fig.7 Capacitance

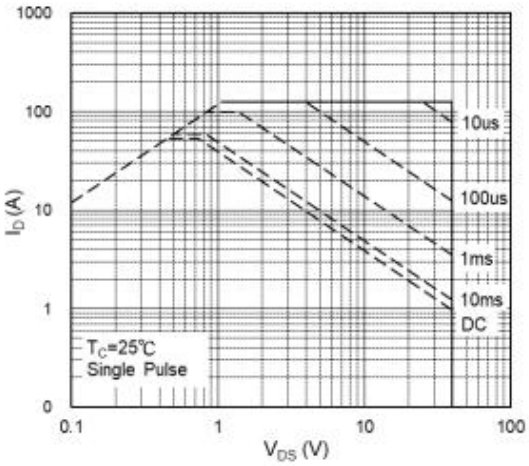


Fig.8 Safe Operating Area

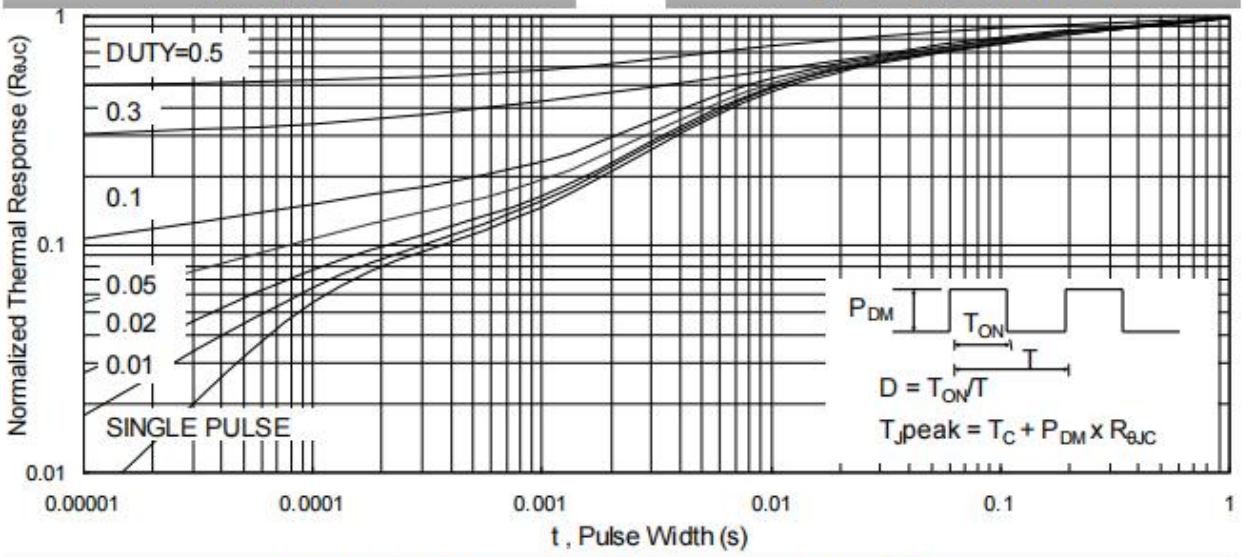


Fig.9 Normalized Maximum Transient Thermal Impedance

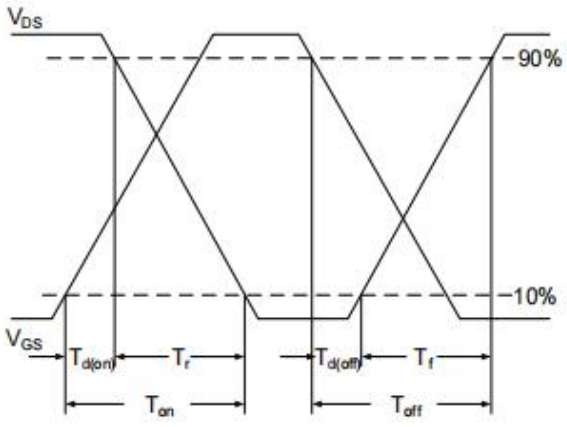


Fig.10 Switching Time Waveform

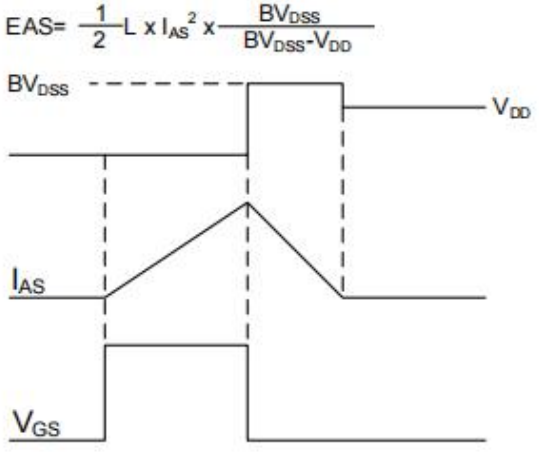
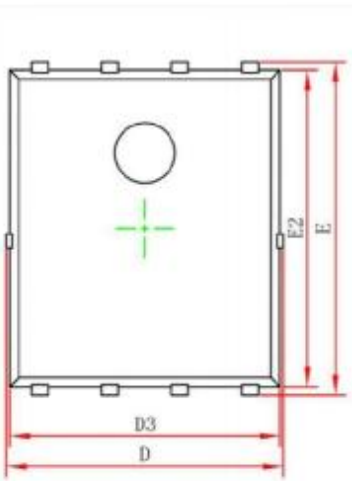
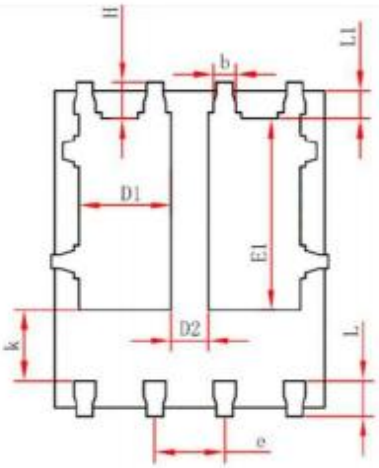


Fig.11 Unclamped Inductive Waveform

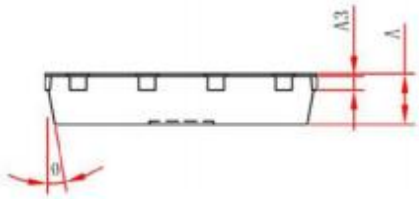
Package Dimensions PDFN5x6-8L



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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