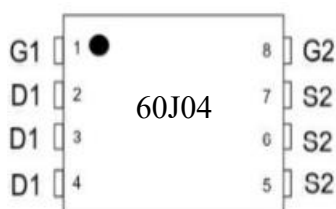


**Features**

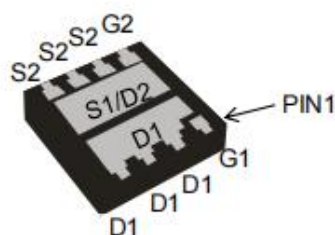
- Split Gate Trench MOSFET technology
- Fast Switching Speed
- Green Device Available

Bvdss**40V*****Rdson*****6.9mΩ*****ID*****40A****Application**

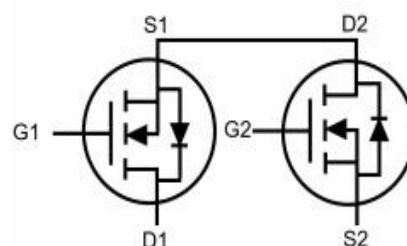
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

RoHS**Package**

Marking and pin assignment



DFN5x6-8L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
60J04	S60J04F	DFN5x6-8L	5000

Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS}@10V^1$	I_D	40	A
		25	A
Pulsed Drain Current ²	I_{DM}	100	A
Single Pulsed Avalanche Energy ³	EAS	28	mJ
Avalanche Current	I_{AS}	40	A
Power Dissipation ⁴	P_D	29	W
Operating Junction Temperature Range	T_J	$-55 \sim 150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim 150$	$^{\circ}\text{C}$



Thermal Resistance Ratings

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

Ordering Information

Ordering Number	Package	Pin Assignment						Packing
Halogen Free		G1	G2	D1	D2	S1	S2	
HLS60J04F	DFN5x6-8L	1	8	2,3,4	-	-	4,5,6	Tape Reel

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

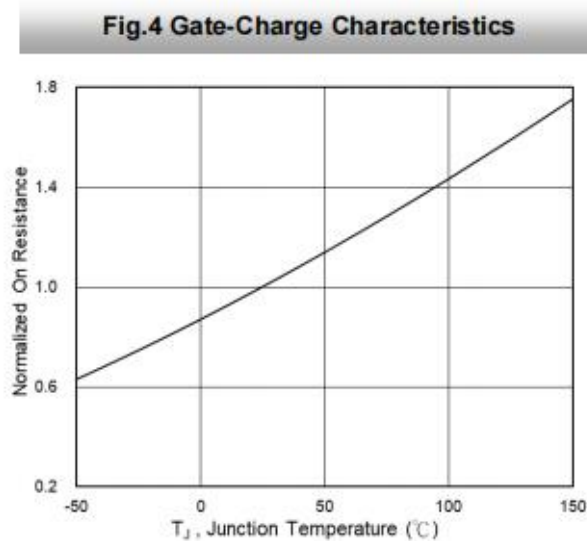
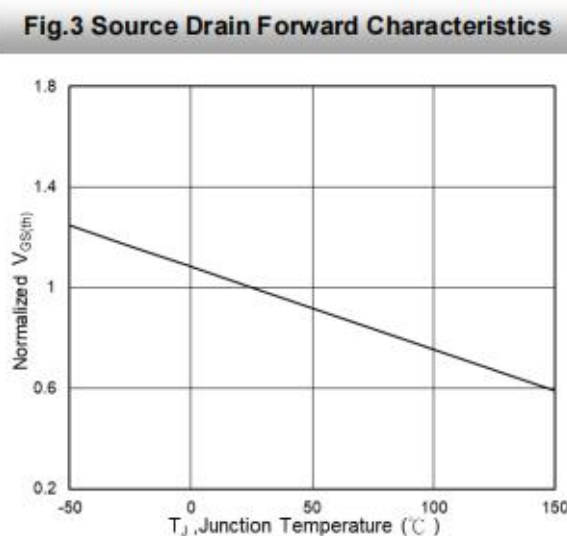
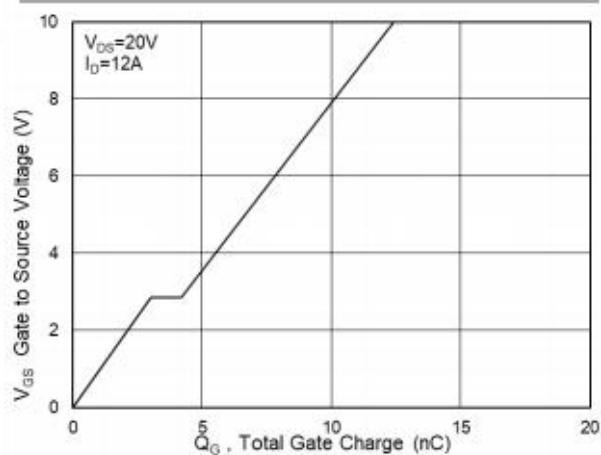
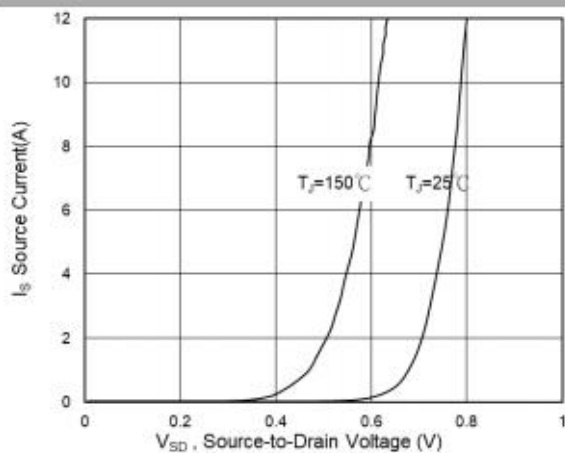
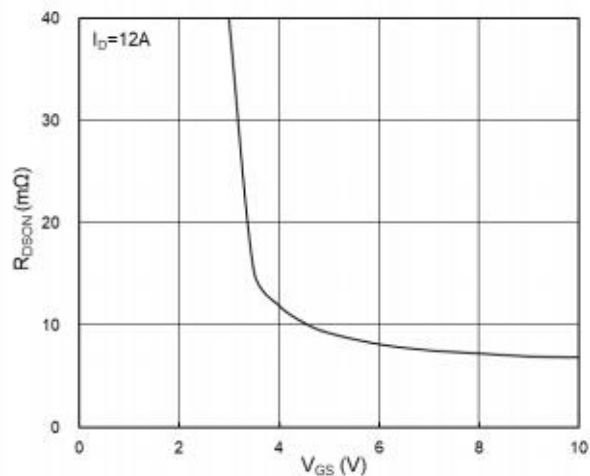
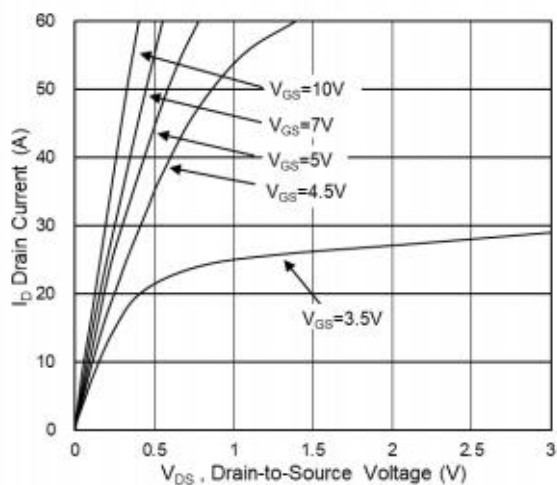
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=32V, V_{GS}=0V$	-	-	1	μA
Gate to Body Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.35	-	3	V
Static Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS}=10V, I_D=12A$	-	6.9	8.5	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	10	15	
Forward Transconductance	g_{fs}	-	-	-	-	S
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	-	1.7	-	Ω
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	$T_{d(on)}$	$V_{GS}=10V, V_{DD}=15V, R_G=3.3\Omega, I_D=1A$	-	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 Time	t_{rr}	-	-	-	-	nC
Body Diode Reverse Recovery Charge	Q_{rr}		-	-	-	
Diode Forward Current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force Current}$	-	-	40	A
Diode Forward Voltage	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 $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=31A$.
- 4.The power dissipation is limited by 150°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.



Typical Performance Characteristics



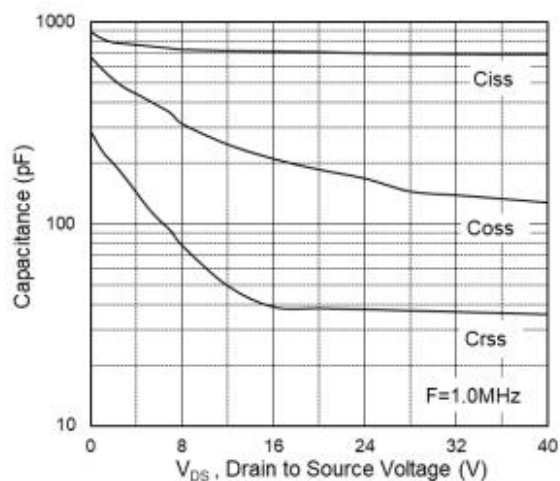


Fig.7 Capacitance

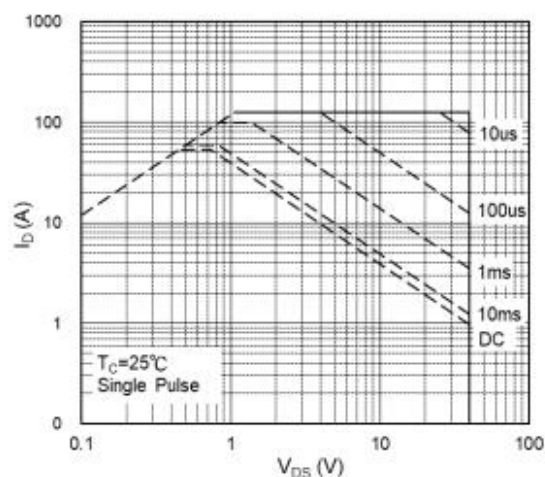


Fig.8 Safe Operating Area

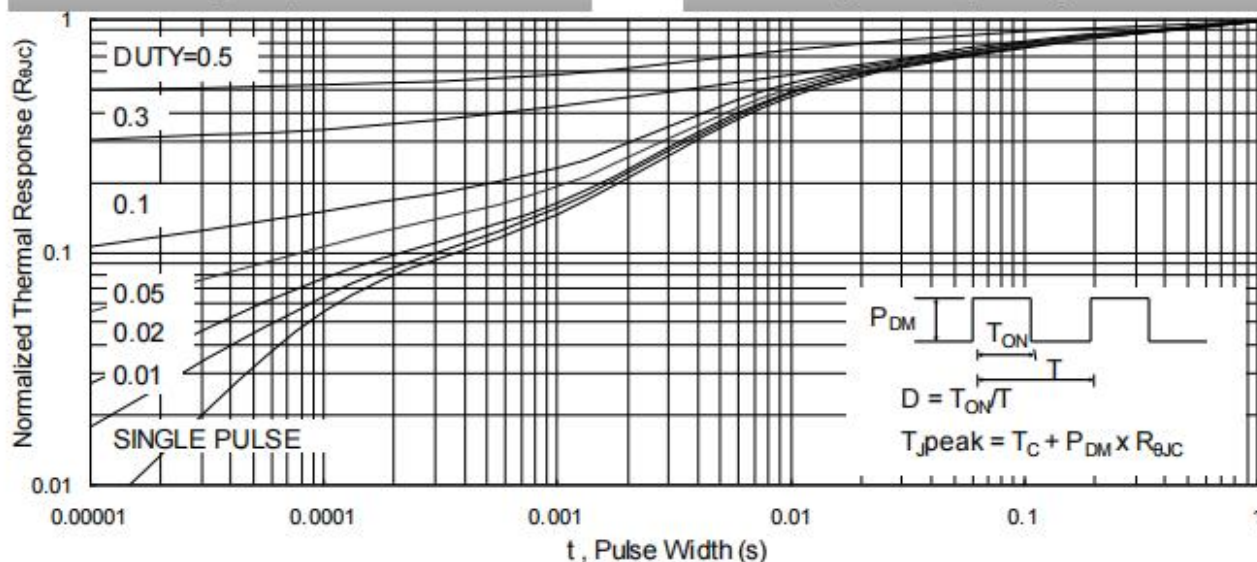


Fig.9 Normalized Maximum Transient Thermal Impedance

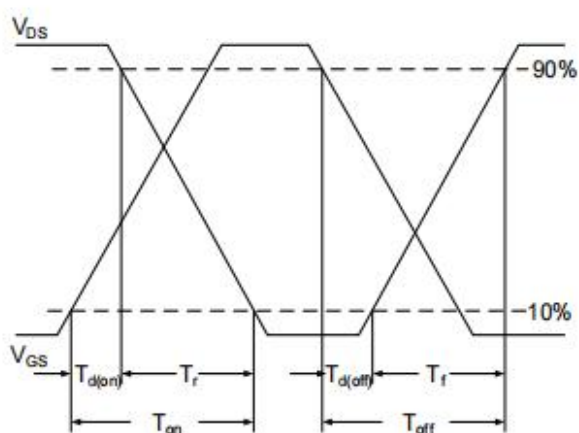


Fig.10 Switching Time Waveform

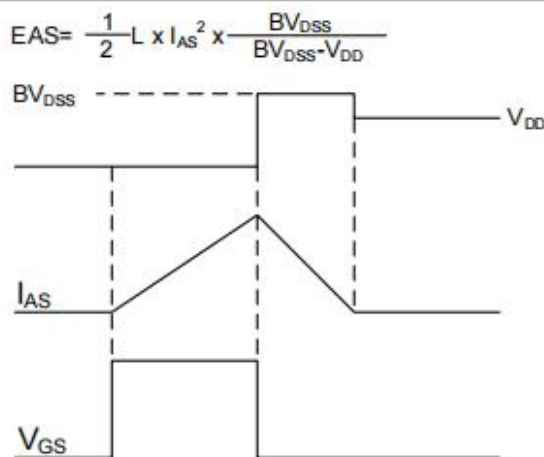
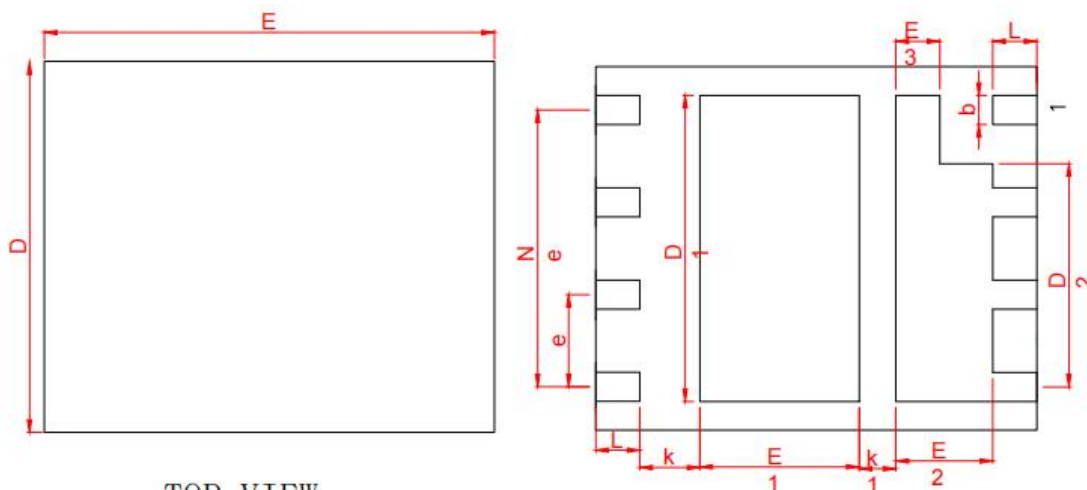
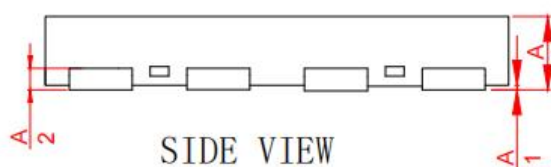


Fig.11 Unclamped Inductive Waveform

**Package Dimensions DFN5x6-8L**

TOP VIEW

BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
* A1	0.00	0.02	0.05
* b	0.36	0.41	0.46
* A2	0.203 BSC		
* D	4.90	5.00	5.10
* D1	4.15	4.20	4.25
* D2	2.87	3.07	3.27
* E	5.90	6.00	6.10
* E1	2.02	2.17	2.32
E2	1.22	1.32	1.42
E3	0.55	0.60	0.65
* e	1.27 REF		
* Ne	BSC 3.81		
k	0.71	0.81	0.91
* k1	0.40	0.50	0.60
* L	0.55	0.60	0.65



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