HUASHUO SEMICONDUCTOR

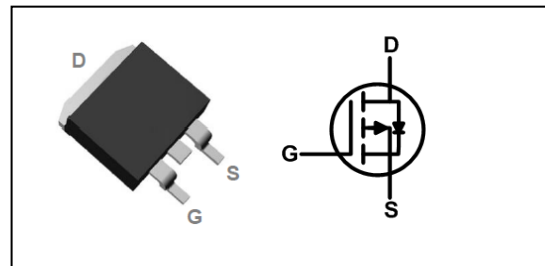**P-Ch 60V Fast Switching MOSFETs**

Description

The HSH047P06 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSH047P06 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

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

Product Summary

V_{DS}	-60	V
$R_{DS(ON),typ}$	3.9	mΩ
I_D	-150	A

TO263 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25°C	Continuous Drain Current[1]	-150	A
I_D@T_C=100°C	Continuous Drain Current[1]	-85	A
I_{DM}	Pulsed Drain Current[2]	-520	A
EAS	Single Pulse Avalanche Energy[3]	480	mJ
P_D@T_C=25°C	Total Power Dissipation[4]	183	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	62	°C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	0.68	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-50A	---	3.9	4.7	mΩ
		V_{GS}=-4.5V , I_D=-30A	---	4.8	6.2	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-1.5	-2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=55℃	---	---	-10	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-10V ,I_D=-3A	---	18	---	S
Q_g	Total Gate Charge (-4.5V)		---	280	---	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-48V , V_{GS}=-10V , I_D=-5A	---	55	---	
Q_{gd}	Gate-Drain Charge		---	24	---	
$T_{d(on)}$	Turn-On Delay Time		---	88	---	ns
T_r	Rise Time	V_{DD}=-48V , V_{GS}=-10V , R_G=6Ω, I_D=-1A	---	258	---	
$T_{d(off)}$	Turn-Off Delay Time		---	509	---	
T_f	Fall Time		---	244	---	
C_{iss}	Input Capacitance		---	17900	---	pF
C_{oss}	Output Capacitance	V_{DS}=-25V , V_{GS}=0V , f=1MHz	---	1701	---	
C_{rss}	Reverse Transfer Capacitance		---	680	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-150	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-40A , T_J=25℃	---	---	-1	V
Trr	Reverse Recovery Time		---	46	---	ns
Qrr	Reverse Recovery Charge	Isd=-10A,dI/dt=100A/us	---	117	---	nC

Note :
1.The data tested by surface mounted on a 1 inch[2] 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,Ias=98A
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.

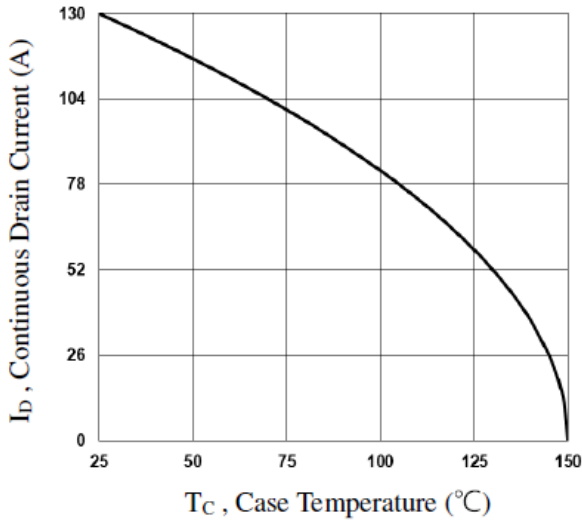**HUASHUO SEMICONDUCTOR**

Typical Characteristics
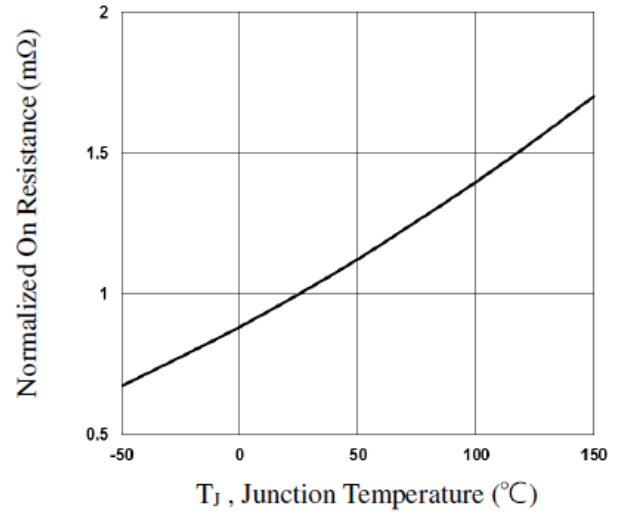
Fig.1 Continuous Drain Current vs.Tc
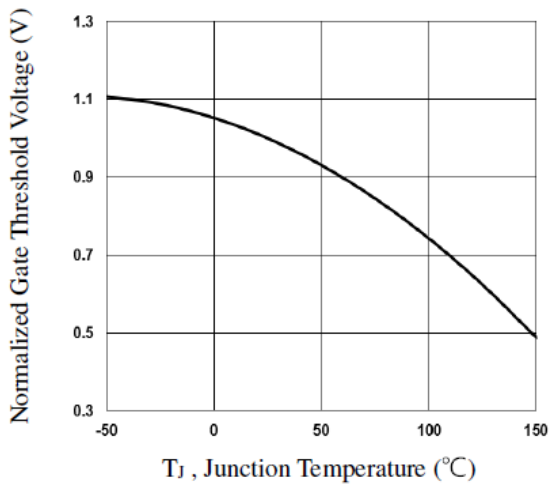
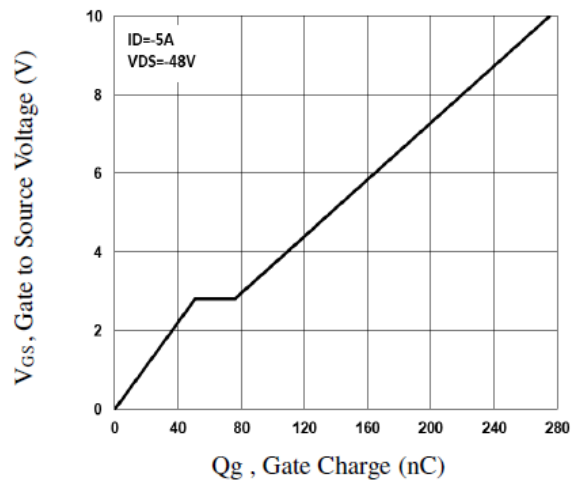**Fig.2 Normalized RDSON vs.Tj**

Fig.3 Normalized Vth vs.Tj
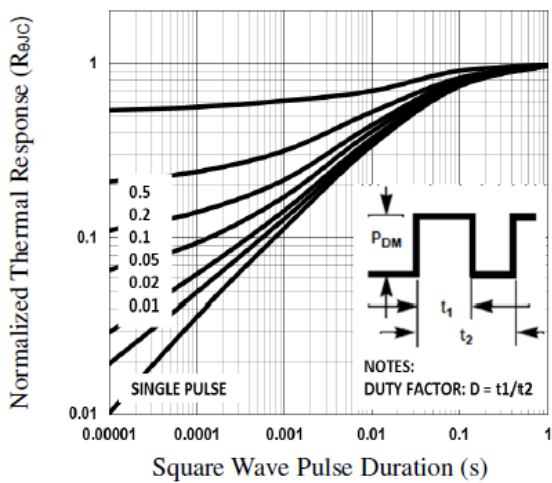
Fig.4 Gate Charge Characteristics

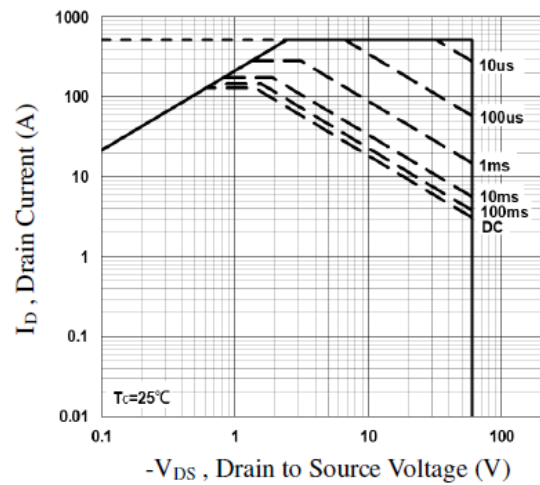**Fig.5 Normalized Transient Impedance**

Fig.6 Maximum Safe Operation Area

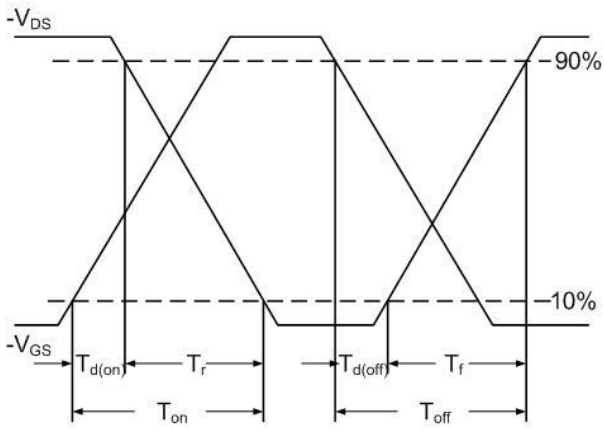## P-Ch 60V Fast Switching MOSFETs

Fig.7 Switching Time Waveform

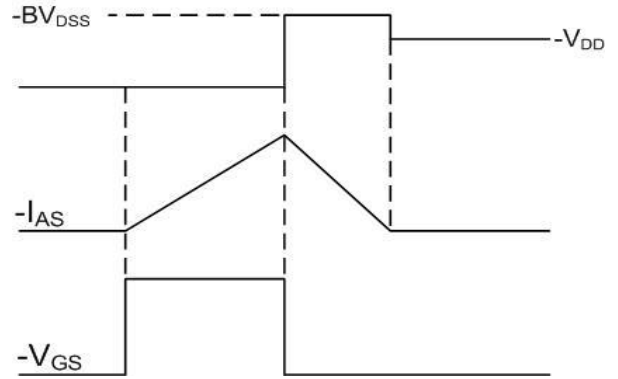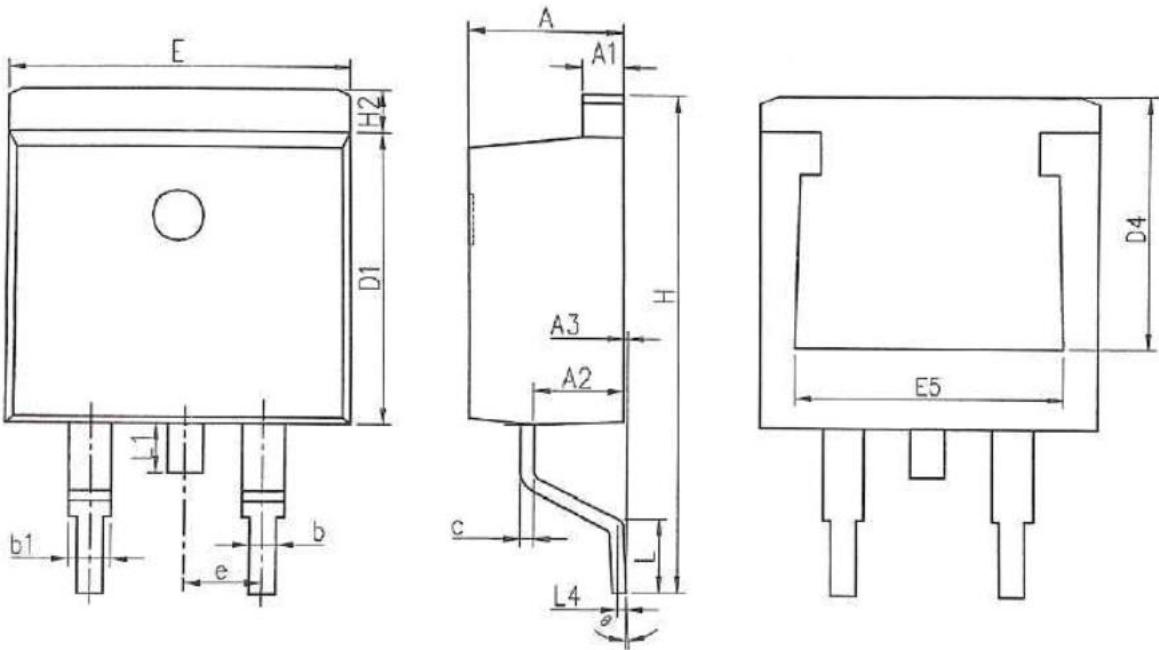$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS} - (-V_{DD})}$$

Fig.8 Gate Charge Waveform

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P-Ch 60V Fast Switching MOSFETs

SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.370	4.770	0.172	0.188
A1	1.220	1.420	0.048	0.056
A2	2.200	2.890	0.087	0.114
A3	0.000	0.250	0.000	0.010
b	0.700	0.960	0.028	0.038
b1	1.170	1.470	0.046	0.058
c	0.300	0.530	0.012	0.021
D1	8.500	9.300	0.335	0.366
D4	6.600	-	0.260	-
E	9.860	10.36	0.388	0.408
E5	7.060	-	0.278	-
e	2.540 BSC		0.100 BSC	
H	14.70	15.70	0.579	0.618
H2	1.070	1.470	0.042	0.058
L	2.000	2.600	0.079	0.102
L1	1.400	1.750	0.055	0.069
L4	0.250 BSC		0.010 BSC	
Θ	0°	9°	0°	9°

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