HUASHUO SEMICONDUCTOR

HSP3105

General Description

The HSP3105 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 HSP3105 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}	-30	V
$R_{DS(ON),max}$	14	mΩ
I_D	-60	A

TO-220 Pin Configuration
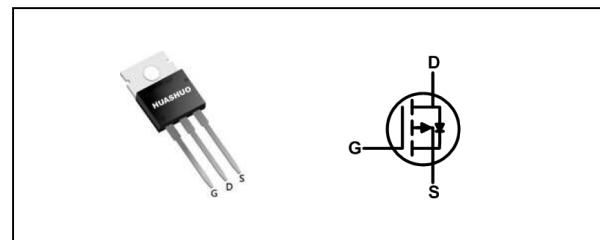
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ -10V[1]	-60	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ -10V[1]	-38	A
I_{DM}	Pulsed Drain Current[2]	-150	A
EAS	Single Pulse Avalanche Energy[3]	125	mJ
I_{AS}	Avalanche Current	-50	A
P_D@T_A=25°C	Total Power Dissipation[4]	74	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
	Thermal Resistance Junction-Ambient [1](t≤10s)	---	1.68	°C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	24	°C/W

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	-30	---	---	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=-10V , I$_D$=-30A	---	10	14	mΩ
		V$_{GS}$=-4.5V , I$_D$=-15A	---	16	22	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.0	---	-2.5	V
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=-24V , V$_{GS}$=0V , T$_J$=25℃	---	---	-1	uA
		V$_{DS}$=-24V , V$_{GS}$=0V , T$_J$=55℃	---	---	-5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=-5V , I$_D$=-10A	---	30	---	S
R$_g$	Gate Resistance	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	9	---	Ω
Q$_g$	Total Gate Charge (-4.5V)	V$_{DS}$=-15V , V$_{GS}$=-4.5V , I$_D$=-15A	---	22	---	nC
Q$_{gs}$	Gate-Source Charge		---	8.7	---	
Q$_{gd}$	Gate-Drain Charge		---	7.2	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω I$_D$=-15A	---	8	---	ns
T$_r$	Rise Time		---	73.7	---	
T$_{d(off)}$	Turn-Off Delay Time		---	61.8	---	
T$_f$	Fall Time		---	24.4	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	2215	---	pF
C$_{oss}$	Output Capacitance		---	310	---	
C$_{rss}$	Reverse Transfer Capacitance		---	237	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current[1,5]	V$_G$=V$_D$=0V , Force Current	---	---	-60	A
V$_{SD}$	Diode Forward Voltage[2]	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃	---	---	-1	V

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,I$_{AS}$=-50A

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.
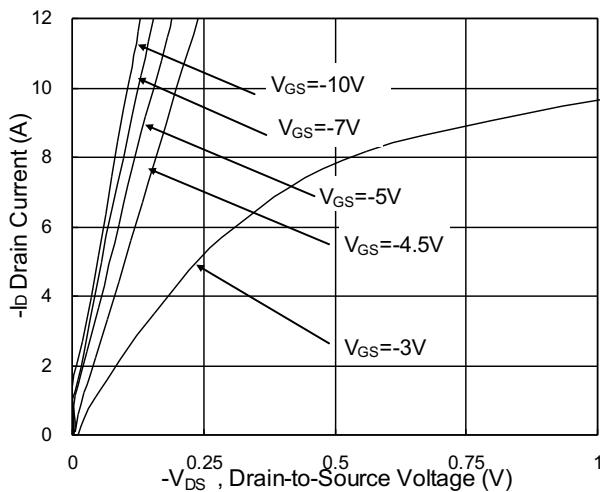
Fig.1 Typical Output Characteristics
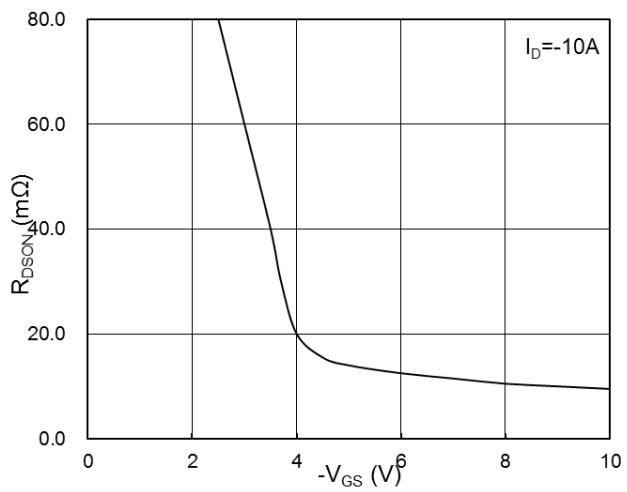

Fig.2 On-Resistance vs. G-S Voltage
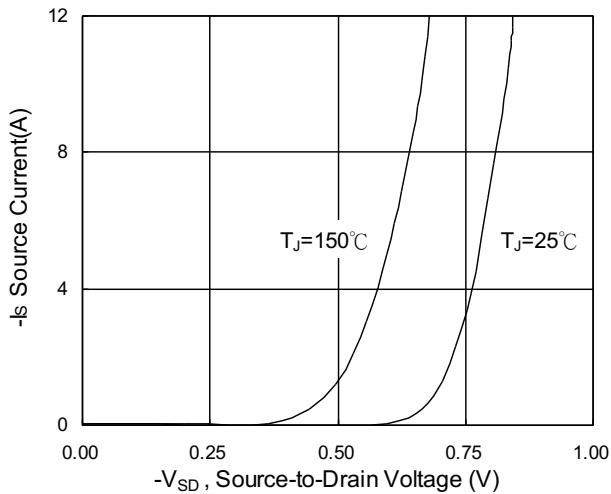
**Fig.3 Source Drain Forward Characteristics**
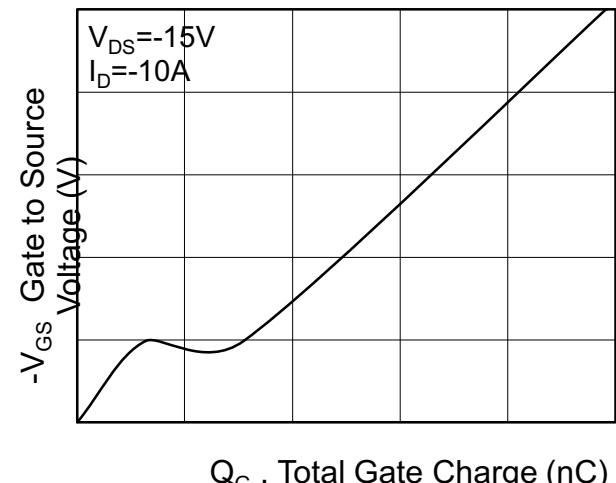
Fig.4 Gate-charge Characteristics
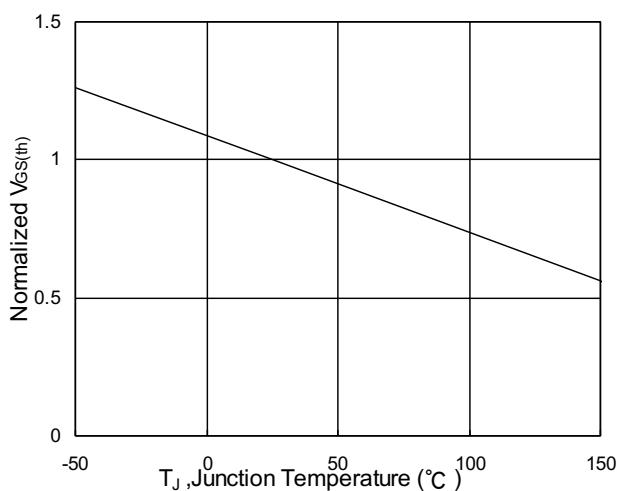
Fig.5 Normalized $V_{GS(th)}$ vs. T_J
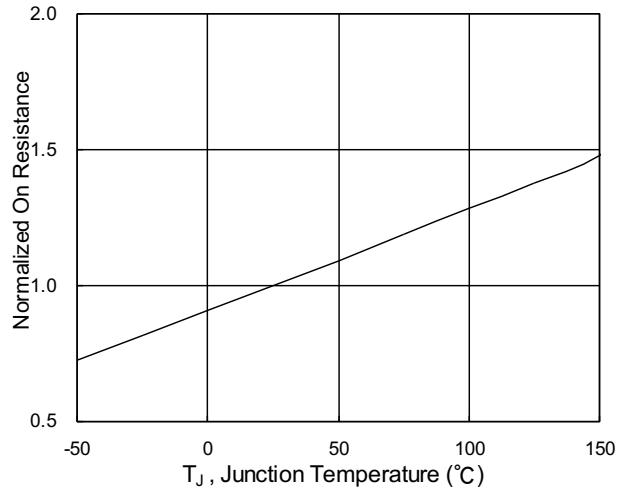
Fig.6 Normalized R_{DSON} vs. T_J

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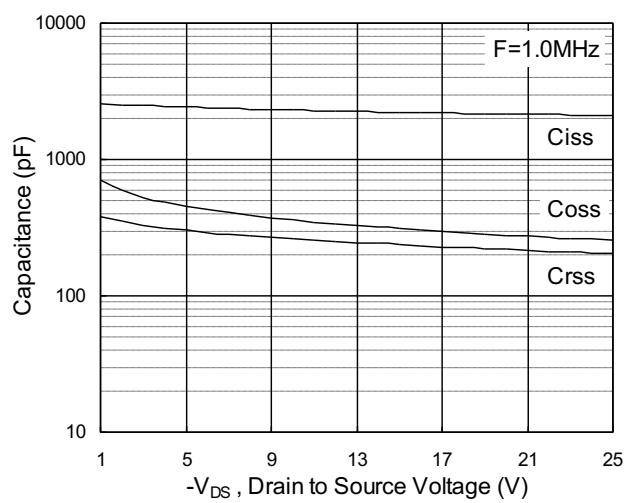
Fig.7 Capacitance
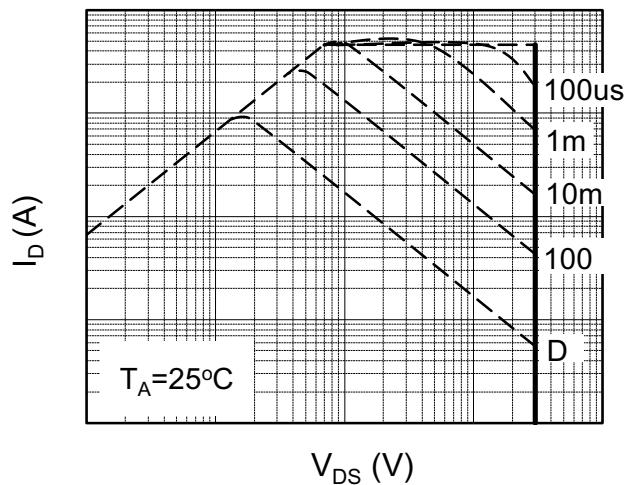
Fig.8 Safe Operating Area

$$D = T_{ON}/T$$
$$T_{Jpeak} = T_C + P_{DM} X R_{\theta JC}$$
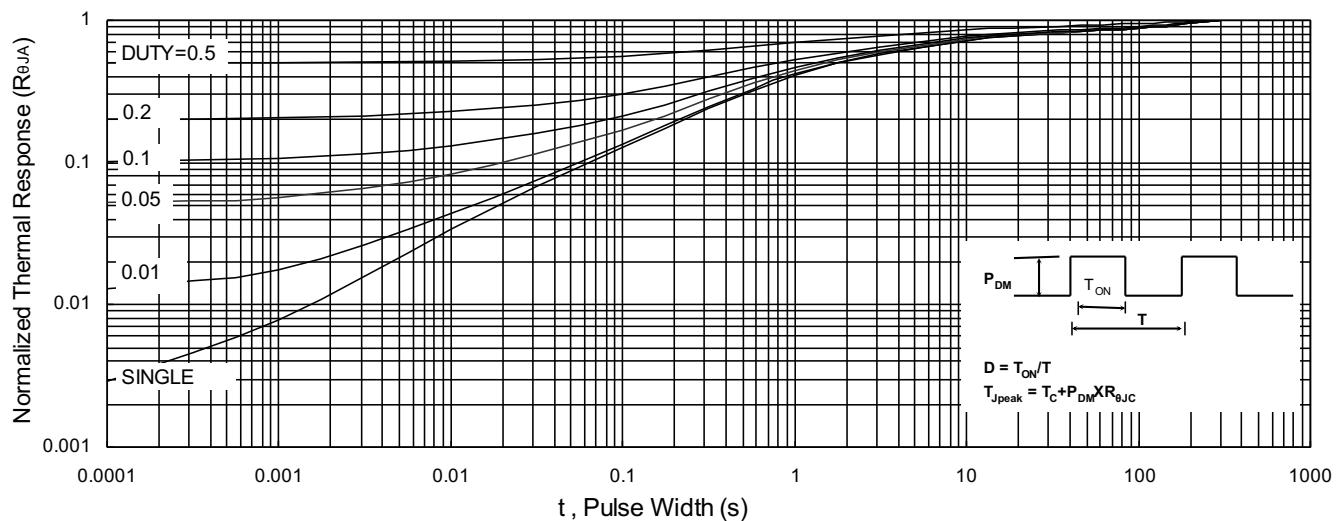
Fig.9 Normalized Maximum Transient Thermal Impedance
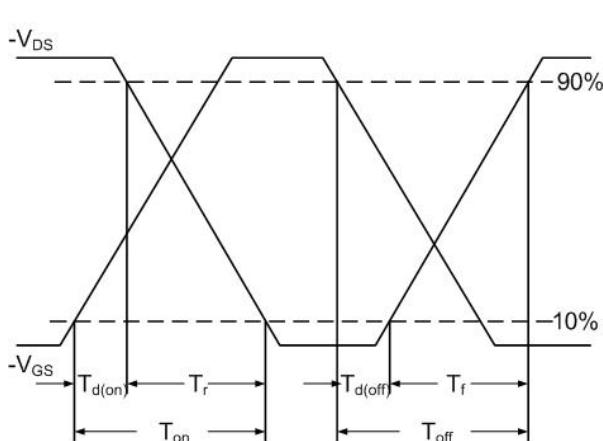
Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS} - (-V_{DD})}$$
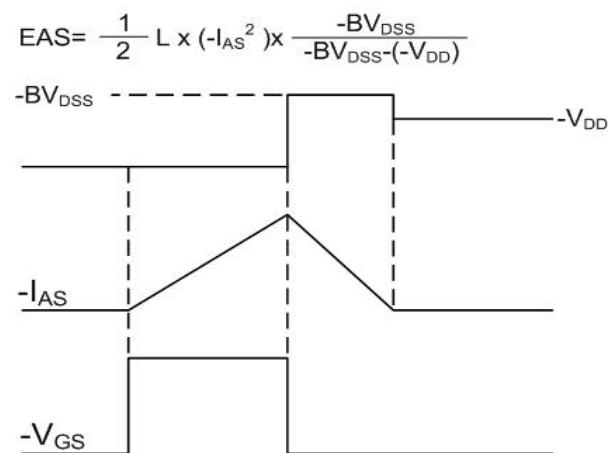
Fig.11 Unclamped Inductive Waveform