HUASHUO SEMICONDUCTOR

HSK4N10

N-Ch 100V Fast Switching MOSFETs

Description

The HSK4N10 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.
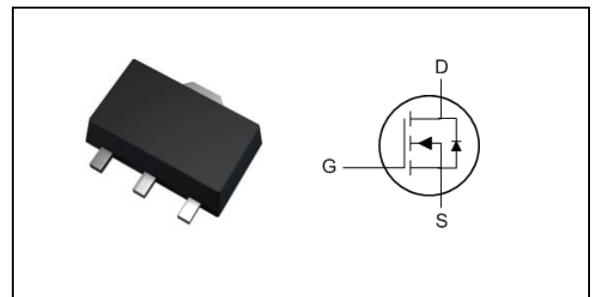
The HSK4N10 meet the RoHS and Green Product requirement with full function reliability approved.

- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

Product Summary

V_{DS}	100	V
$R_{DS(ON),typ}$	150	mΩ
I_D	4	A

SOT89 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	$\pm$20	V
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	4	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	3.2	A
I_{DM}	Pulsed Drain Current[2]	16	A
P_D@T_A=25°C	Total Power Dissipation[3]	1.25	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
$R_{\theta JA}$	Thermal Resistance Junction-ambient(steady state)[1]	---	100	°C/W
	Thermal Resistance Junction-ambient(t<10s)[1]	---	75	°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	100	---	---	V
△BV$_{DSS}$/△T$_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.122	---	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance2	V$_{GS}$=10V , I$_D$=4A	---	150	165	mΩ
		V$_{GS}$=4.5V , I$_D$=4A	---	160	175	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.0	1.6	2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4.84	---	mV/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=80V , V$_{GS}$=0V , T$_J$=25℃	---	---	10	uA
		V$_{DS}$=80V , V$_{GS}$=0V , T$_J$=55℃	---	---	100	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=5V , I$_D$=2A	1	---	---	S
Q$_g$	Total Gate Charge (10V)	V$_{DS}$=50V , V$_{GS}$=10V , I$_D$=1A	---	20	---	nC
Q$_{gs}$	Gate-Source Charge		---	2.9	---	
Q$_{gd}$	Gate-Drain Charge		---	3	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=50V , V$_{GS}$=10V , R$_G$=3.3Ω I$_D$=1A	---	6	---	ns
T$_r$	Rise Time		---	4	---	
T$_{d(off)}$	Turn-Off Delay Time		---	20	---	
T$_f$	Fall Time		---	4	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=50V , V$_{GS}$=0V , f=1MHz	---	690	---	pF
C$_{oss}$	Output Capacitance		---	31	---	
C$_{rss}$	Reverse Transfer Capacitance		---	20	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current1,4	V$_G$=V$_D$=0V , Force Current	---	---	4	A
V$_{SD}$	Diode Forward Voltage2	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1.2	V

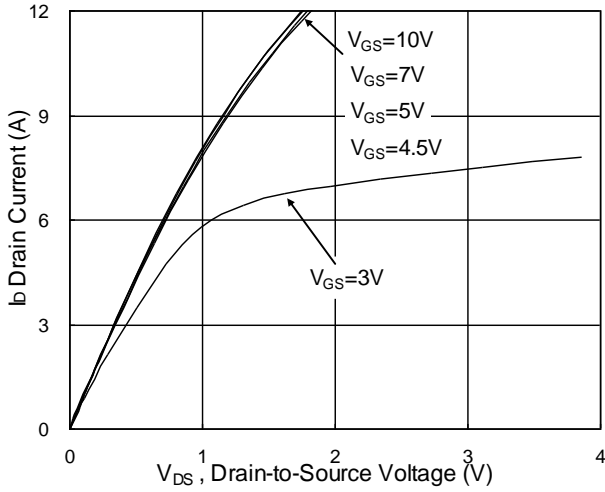Note :
1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The power dissipation is limited by 150℃ junction temperature
4.The data is theoretically the same as I$_D$ and I$_{DM}$, in real applications , should be limited by total power dissipation.
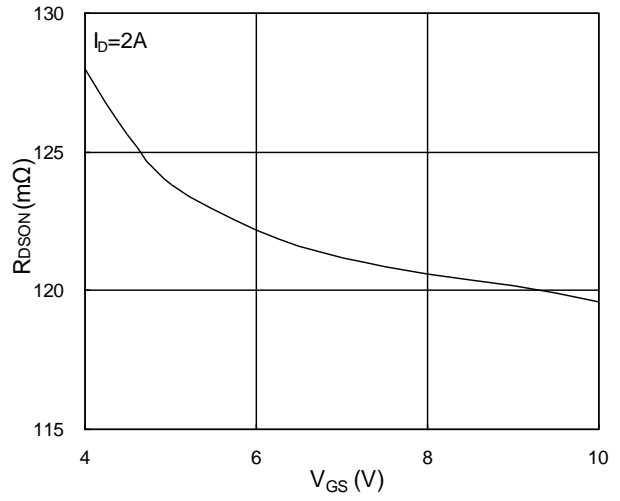
HUASHUO SEMICONDUCTOR
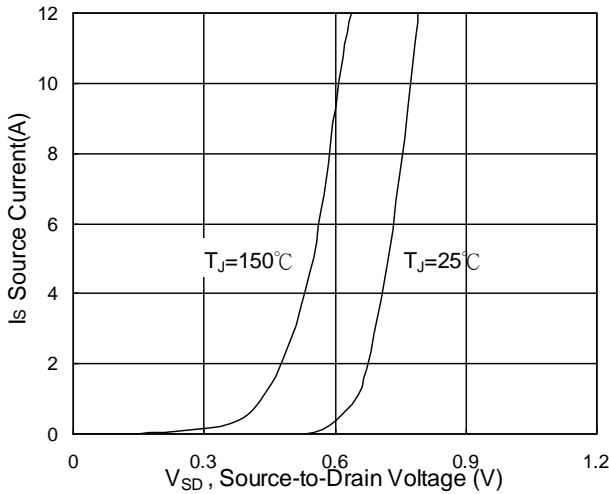
N-Ch 100V Fast Switching MOSFETs
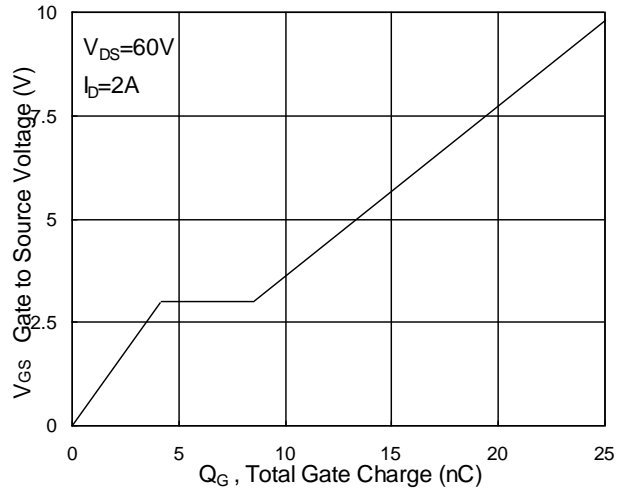
Typical Characteristics

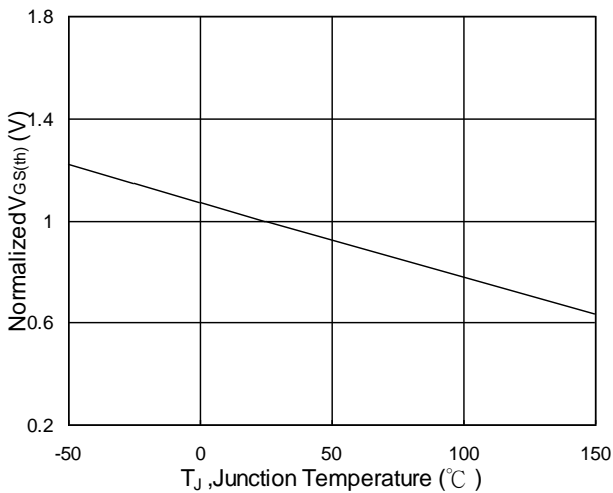**Fig.1 Typical Output Characteristics**
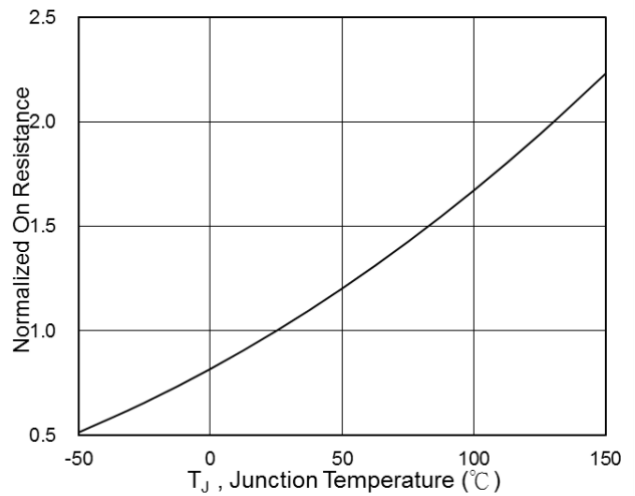

Fig.2 On-Resistance vs. Gate-Source

Fig.3 Forward Characteristics Of Reverse

Fig.4 Gate-Charge Characteristics

Fig.5 Normalized V$_{GS(th)}$ vs. T$_J$

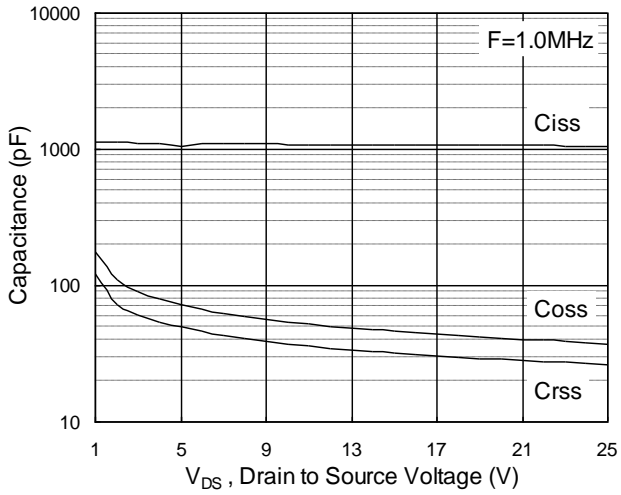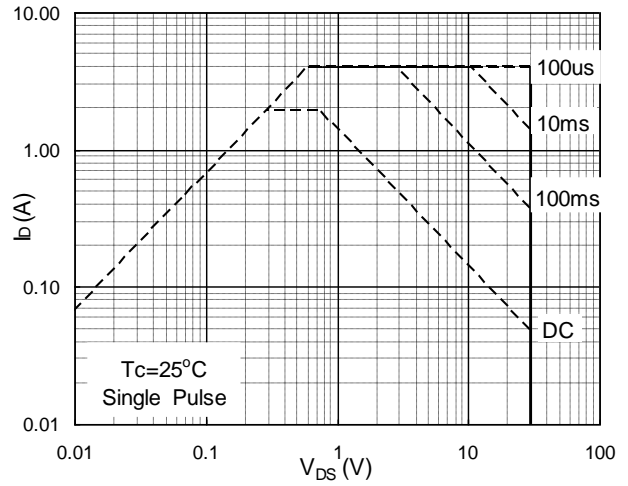**Fig.6 Normalized R$_{DSON}$ vs. T$_J$**
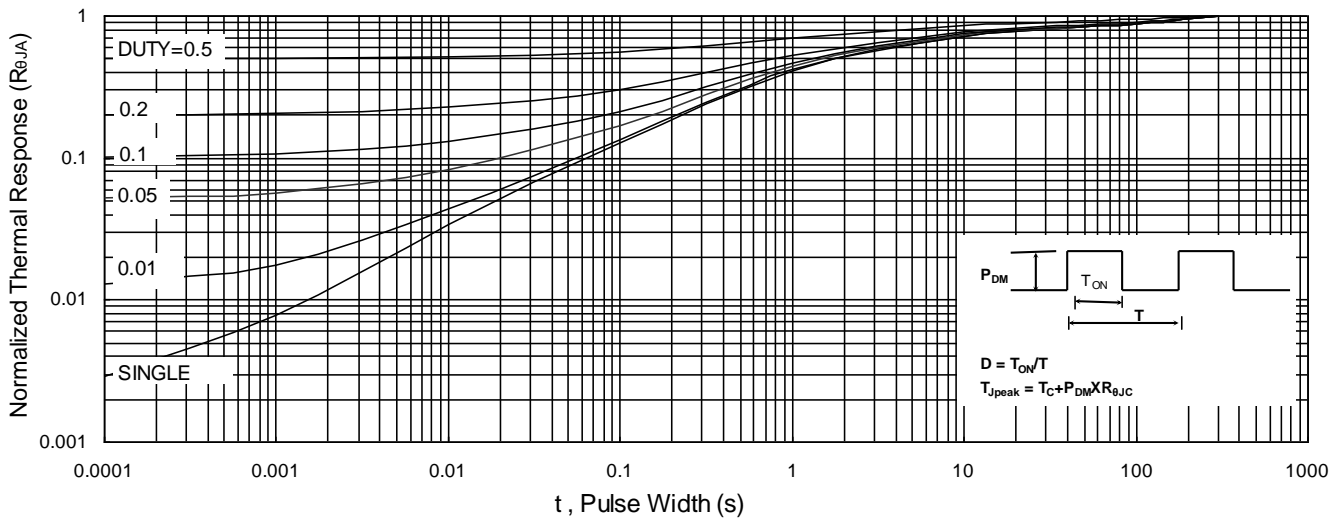
Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

$D = T_{ON}/T$

$T_{Jpeak} = T_C + P_{DM} X R_{\theta JC}$

Fig.10 Switching Time Waveform

Fig.11 Gate Charge Waveform

Ordering Information

Part Number	Package code	Packaging
HSK4N10	SOT-89	1000/Tape&Reel

SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.397	1.600	0.055	0.063
b	0.420	0.540	0.017	0.021
b1	0.420	0.540	0.017	0.021
B	2.388	2.591	0.094	0.102
C	3.937	4.242	0.155	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.350	0.44	0.014	0.017