

#### **Description**

The HSM0228 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 HSM0228 meet the RoHS and Green Product requirement with full function reliability approved.

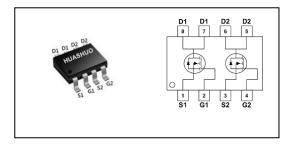
## Vns

**Product Summary** 

V <sub>D</sub> S	100	V
RDS(ON),max	68	mΩ
lo	4	Α

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

## **SOP8 Pin Configuration**



#### **Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	Drain-Source Voltage 100	
Vgs	Gate-Source Voltage	Gate-Source Voltage ±20	
Id@Ta=25°C	Continuous Drain Current, Vgs @ 10V1	4	А
ID@TA=70°C	Continuous Drain Current, Vos @ 10V1	Continuous Drain Current, VGs @ 10V1 3	
Ірм	Pulsed Drain Current <sub>2</sub>	25	А
Pd@Ta=25°C	Total Power Dissipation₃	1.5	W
Тѕтс	Storage Temperature Range -55 to 150		°C
TJ	Operating Junction Temperature Range	-55 to 150	°C

#### **Thermal Data**

Symbol	Parameter	meter Typ. Max.		Unit
RеJA	Thermal Resistance Junction-ambient 1		90	°C/W
Reлc	Thermal Resistance Junction-Case <sub>1</sub>		40	°C/W



## Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	Vgs=0V , Ib=250uA	100			V
△BVdss/△TJ	BVDSS Temperature Coefficient	Reference to 25°C , ID=1mA		0.122		V/°C
RDS(ON)	Static Drain-Source On-Resistance2	Vgs=10V , Ib=4A			68	mΩ
RDS(ON)	Static Dialii-Source Off-Resistance2	Vgs=4.5V , Ib=3A			94	mΩ
VGS(th)	Gate Threshold Voltage	\/os_\/os_ lp_250uA	1.2		2.5	V
△VGS(th)	V <sub>GS(th)</sub> Temperature Coefficient	Vgs=Vds , Id =250uA		-4.84		mV/°C
Ipss	Drain Source Leakage Current	Vps=80V , Vgs=0V , Tj=25°C			10	uA
IDSS	Drain-Source Leakage Current	Vps=80V , Vgs=0V , Tj=55°C			100	uA
lgss	Gate-Source Leakage Current	Vgs=±20V, Vps=0V			±100	nA
gfs	Forward Transconductance	Vps=5V , Ip=4A		14		S
Rg	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz		2.1		Ω
Qg	Total Gate Charge (10V)			12		
Qgs	Gate-Source Charge	Vps=50V , Vgs=10V , Ip=4A		2.7		nC
Qgd	Gate-Drain Charge			1.7		
Td(on)	Turn-On Delay Time			3.8		
Tr	Rise Time	$V_{DD}$ =50 $V$ , $V_{GS}$ =10 $V$ , $R_{G}$ =3 $\Omega$		26		
Td(off)	Turn-Off Delay Time	ID=4A		16		ns
Tf	Fall Time			8.8		
Ciss	Input Capacitance			620		
Coss	Output Capacitance	V <sub>DS</sub> =25V , V <sub>GS</sub> =0V , f=1MHz		105		pF
Crss	Reverse Transfer Capacitance			63		

#### **Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
Is	Continuous Source Current <sub>1,4</sub>	Va Va OV Force Current			2.5	Α
lsм	Pulsed Source Current <sub>2,4</sub>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current			25	Α
VsD	Diode Forward Voltage2	Vgs=0V , Is=1A , TJ=25°C			1.2	V

#### Note:

<sup>1.</sup>The data tested by surface mounted on a 1 inch<sub>2</sub> FR-4 board with 2OZ copper.

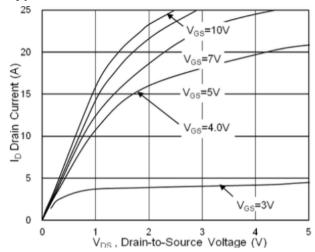
<sup>2.</sup>The data tested by pulsed , pulse width  $\,\leq\,300\text{us}$  , duty cycle  $\,\leq\,2\%$ 

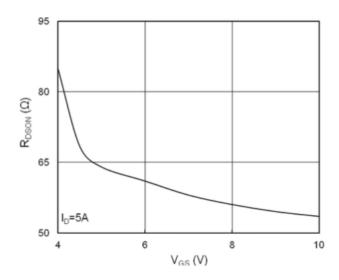
<sup>3.</sup>The power dissipation is limited by 150  $^{\circ}\text{C}\,$  junction temperature

<sup>4.</sup> The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



#### **Typical Characteristics**





**Fig.1 Typical Output Characteristics** 

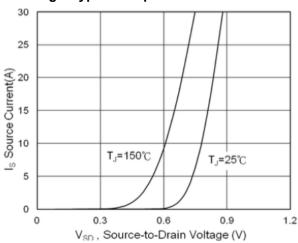


Fig.2 On-Resistance vs. Gate-Source

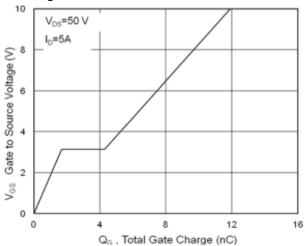


Fig.3 Forward Characteristics Of Reverse

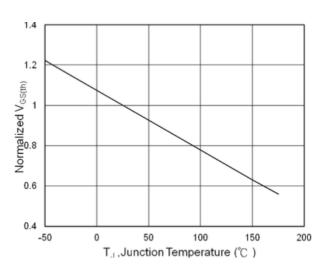


Fig.4 Gate-Charge Characteristics

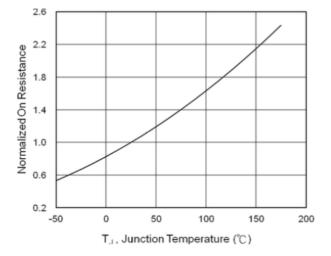
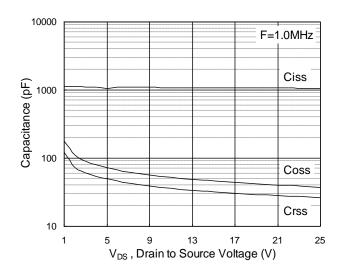


Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

Fig.6 Normalized RDSON vs. TJ





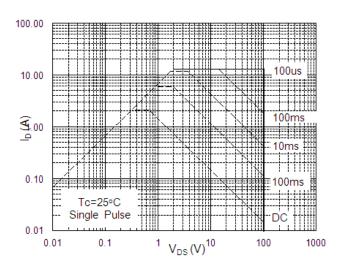


Fig.7 Capacitance

Fig.8 Safe Operating Area

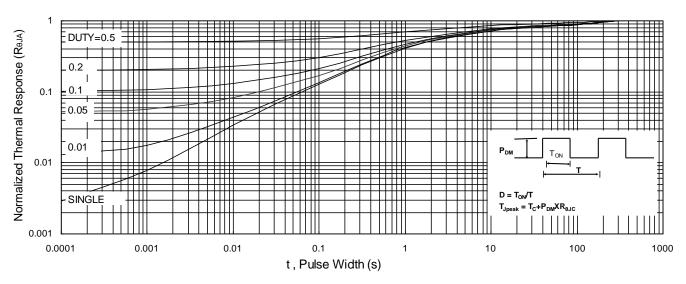
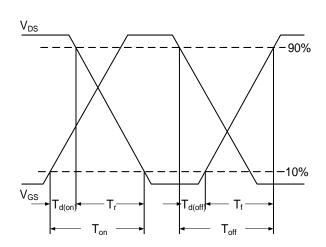


Fig.9 Normalized Maximum Transient Thermal Impedance





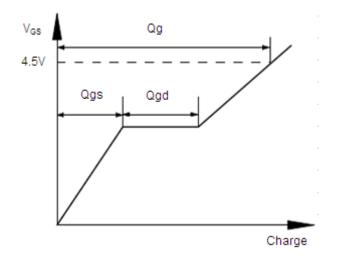
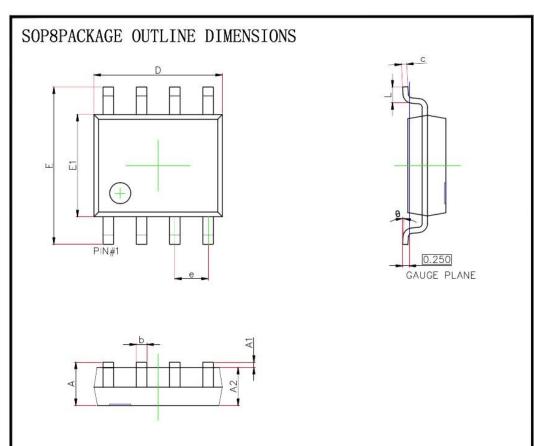


Fig.11 Gate Charge Waveform



# **Ordering Information**

Part Number	Package code	Packaging
HSM0228	SOP-8	2500/Tape&Reel



Cumbal	Dimensions II	n Millimeters	Dimensions In Inches	
Symbol	Min.	Max.	Min.	Max.
Α	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
С	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
е	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°