

**N-Ch 200V Fast Switching MOSFETs**
**Description**

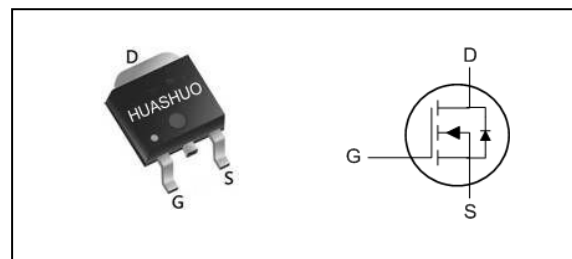
The HSU5N20 is the high cell density trenched N-ch MOSFETs, which provides excellent RDSON and efficiency for most of the small power switching and load switch applications.

The HSU5N20 meets 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**

$V_{DS}$	200	V
$R_{DS(ON),typ}$	0.5	$\Omega$
$I_D$	5	A

**TO-252 Pin Configuration**

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5	A
$I_D@T_C=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	8	A
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>3</sup>	2.7	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	2	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	200	---	---	V
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=1A$	---	0.5	0.8	$\Omega$
		$V_{GS}=4.5V, I_D=1A$	---	0.53	0.9	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	2	3	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=200V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	$\mu A$
		$V_{DS}=200V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=1A$	---	10	---	S
$Q_g$	Total Gate Charge (10V)	$V_{DS}=160V, V_{GS}=10V, I_D=1A$	---	15	---	nC
$Q_{gs}$	Gate-Source Charge		---	2.9	---	
$Q_{gd}$	Gate-Drain Charge		---	5	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=100V, V_{GS}=10V, R_G=3\Omega$ $I_D=1A$	---	22	---	ns
$T_r$	Rise Time		---	30	---	
$T_{d(off)}$	Turn-Off Delay Time		---	44	---	
$T_f$	Fall Time		---	12	---	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	---	900	---	pF
$C_{oss}$	Output Capacitance		---	125	---	
$C_{rss}$	Reverse Transfer Capacitance		---	4.5	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	5	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1	V
$t_{rr}$	Reverse Recovery Time	$I_F=1A, di/dt=100A/\mu s, T_J=25^\circ C$	---	85	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	250	---	nC

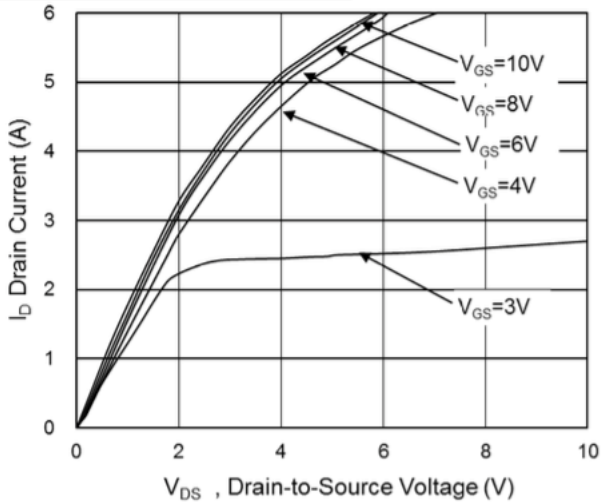
Note:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The power dissipation is limited by 150 $^\circ C$  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.

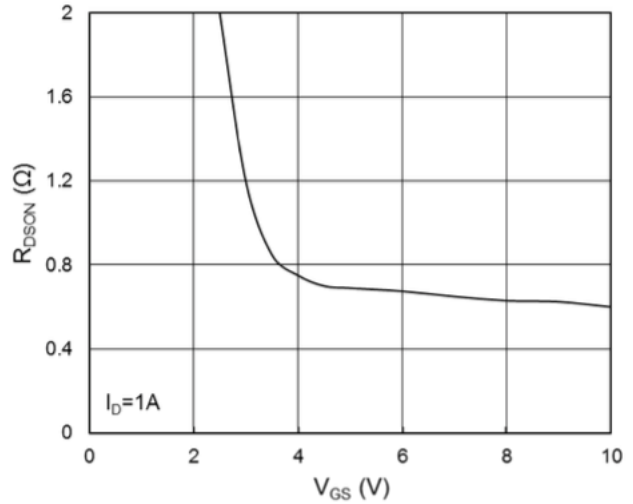


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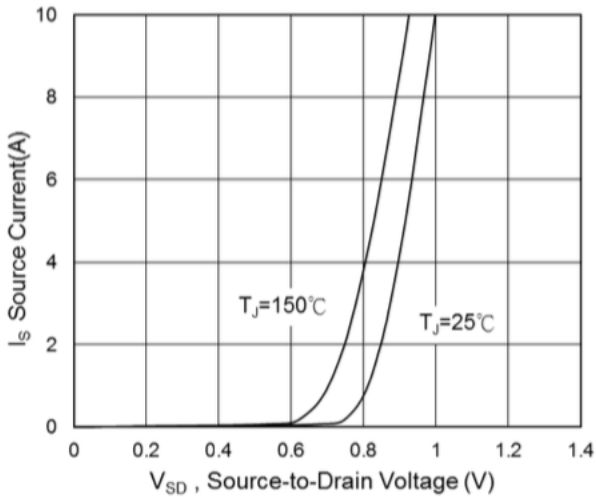
**Typical Characteristics**



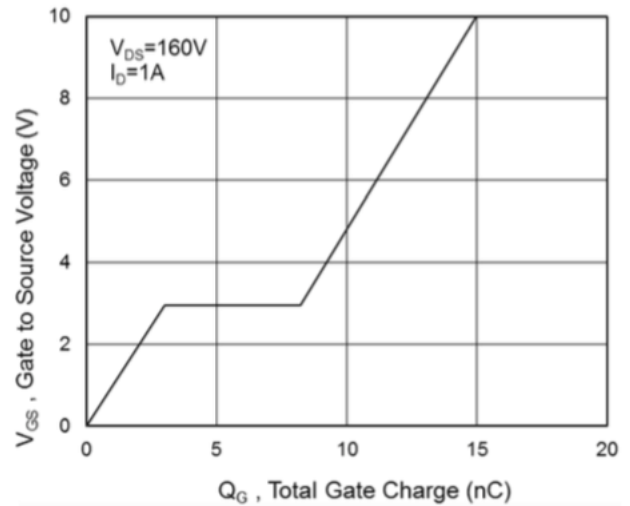
**Fig.1 Typical Output Characteristics**



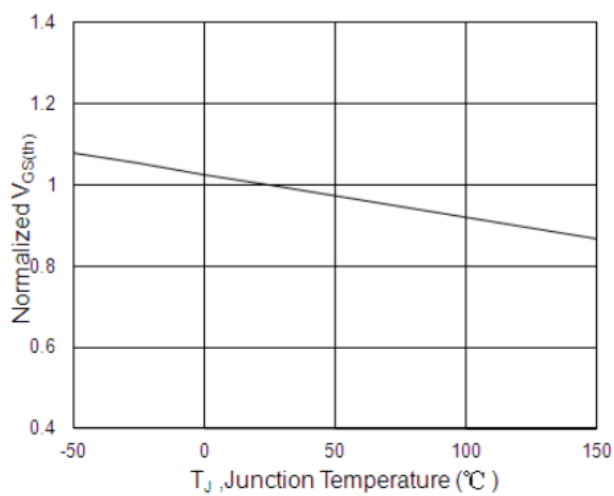
**Fig.2 On-Resistance vs G-S Voltage**



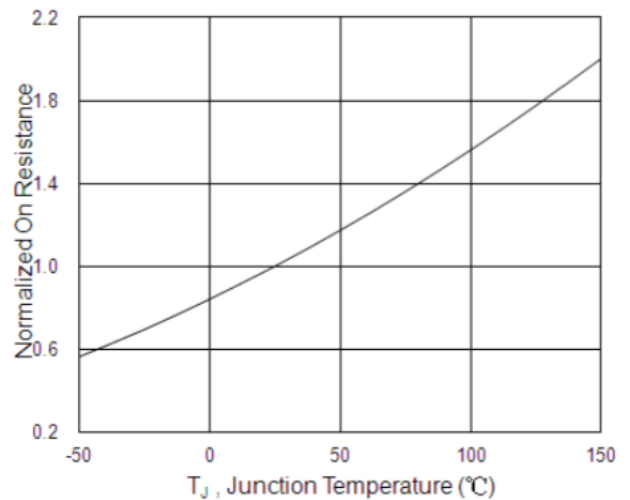
**Fig.3 Forward Characteristics of Reverse**



**Fig.4 Gate-Charge Characteristics**



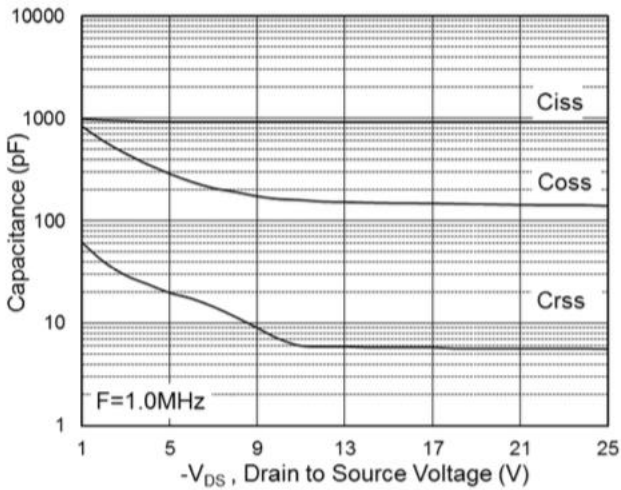
**Fig.5  $V_{GS(th)}$  vs  $T_J$**



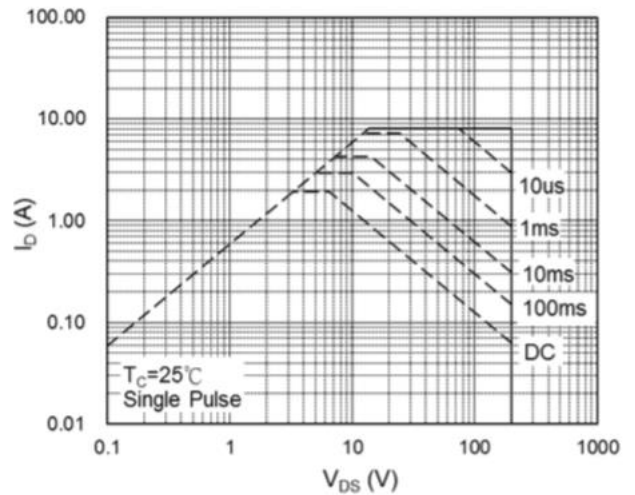
**Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$**



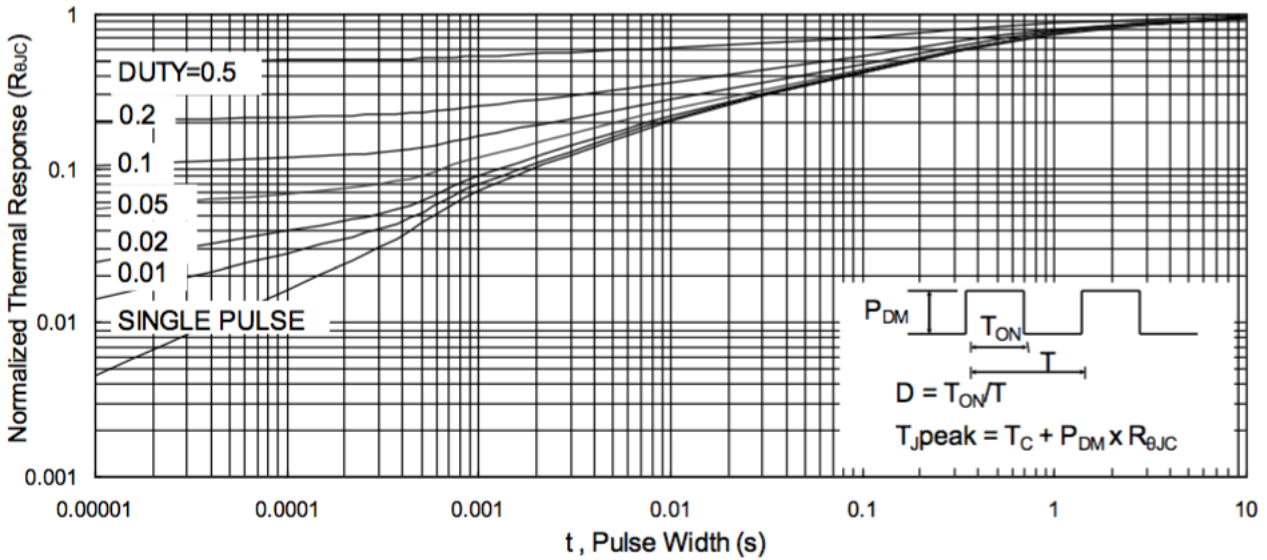
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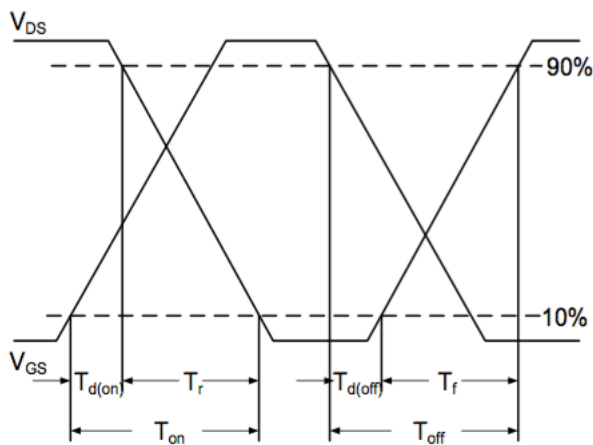
**Fig.7 Capacitance**



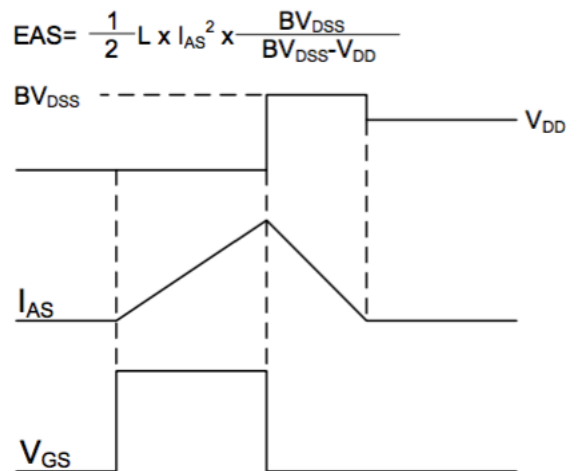
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

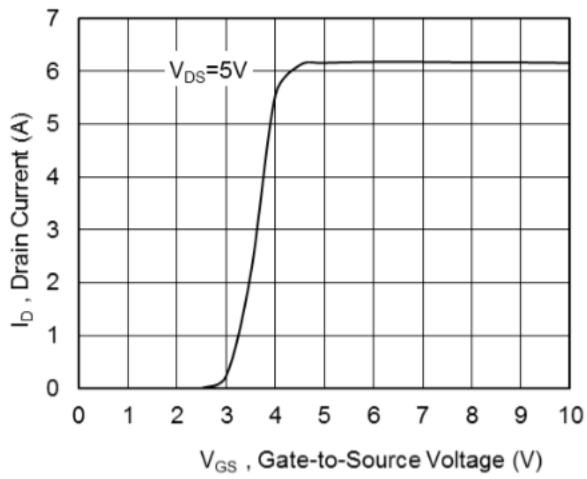


**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

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

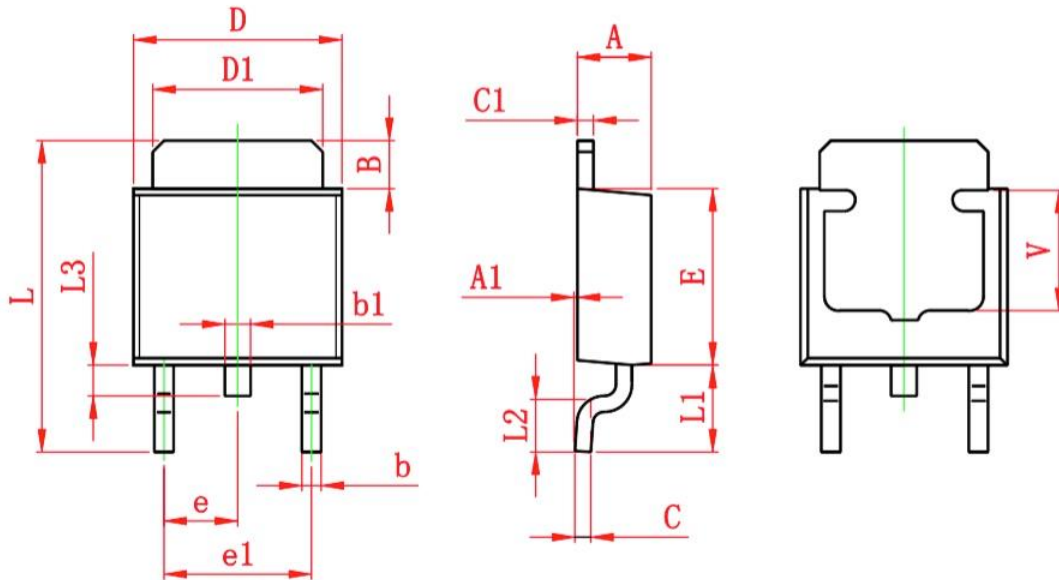


**Fig.12 Transfer Characteristics**



## Ordering Information

Part Number	Package code	Packaging
HSU5N20	TO-252	2500/Tape&Reel



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	

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