

## N-Ch 200V Fast Switching MOSFETs

#### **Description**

The HSH200N02 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

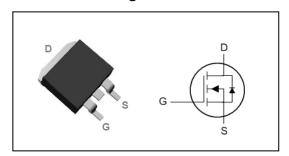
The HSH200N02 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- Power Switching application
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

#### **Product Summary**

VDS	200	V
R <sub>DS</sub> (ON),typ	27	mΩ
lo	70	Α

#### **TO263 Pin Configuration**



#### **Absolute Maximum Ratings**

Symbol Parameter		Rating	Units	
V <sub>DS</sub>	Drain-Source Voltage	Drain-Source Voltage 200		
V <sub>G</sub> S	Gate-Source Voltage	±20	V	
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	70	А	
I <sub>D</sub> @T <sub>C</sub> =100°C	c=100°C Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup> 46		А	
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup> 252		А	
EAS	EAS Single Pulse Avalanche Energy <sup>3</sup> 580		mJ	
P <sub>D</sub> @T <sub>C</sub> =25°C	P <sub>D</sub> @T <sub>C</sub> =25°C Total Power Dissipation <sup>3</sup> 200		W	
T <sub>STG</sub>	Storage Temperature Range -55 to 150		°C	
T <sub>J</sub> Operating Junction Temperature Range		-55 to 150	°C	

#### **Thermal Data**

Symbol	Parameter	Тур.	Max.	Unit
RθJA	Thermal Resistance Junction-ambient <sup>1</sup>		60	°C/W
Rejc	R <sub>BJC</sub> Thermal Resistance Junction-Case <sup>1</sup>		0.55	°C/W



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

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	200			V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =30A		27	33	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2		4	V
lane	Drain-Source Leakage Current	$V_{DS}$ =160V , $V_{GS}$ =0V , $T_{J}$ =25 $^{\circ}$ C	-		1	uA
I <sub>DSS</sub>	Diam-Source Leakage Current	V <sub>DS</sub> =160V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C			5	
I <sub>GSS</sub>	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	ł		±100	nA
Rg	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz		3		Ω
Qg	Total Gate Charge (10V)			110		
$Q_{gs}$	Gate-Source Charge	V <sub>DS</sub> =100V , V <sub>GS</sub> =10V , I <sub>D</sub> =30A	ł	32		nC
$Q_{gd}$	Gate-Drain Charge			38		
T <sub>d(on)</sub>	Turn-On Delay Time		1	30		
Tr	Rise Time	$V_{DD}$ =100V , $V_{GS}$ =10V , $R_{G}$ =2.5 $\Omega$		18		20
T <sub>d(off)</sub>	Turn-Off Delay Time	I <sub>D</sub> =30A		22		ns
T <sub>f</sub>	Fall Time			33		
Ciss	Input Capacitance			5082		
Coss	Output Capacitance	V <sub>DS</sub> =25V , V <sub>GS</sub> =0V , f=1MHz	-	343		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			129		

#### **Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
Is	Continuous Source Current <sup>1,5</sup>	V- V- OV Force Current			70	Α
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current			252	Α
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =30A , T <sub>J</sub> =25°C			1.2	V
t <sub>rr</sub>	Reverse Recovery Time	IF=30A , dI/dt=100A/μs ,		47		nS
Qrr	Reverse Recovery Charge	TJ=25°C		81		nC

#### Note:

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

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

<sup>3.</sup>The EAS data shows Max. rating . The test condition is  $V_{\text{DD}}$ =25V, $V_{\text{GS}}$ =10V,L=0.3mH

<sup>4.</sup>The power dissipation is limited by 150°C junction temperature

<sup>5.</sup> 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**

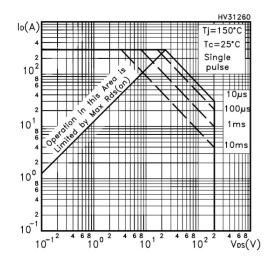


Fig.1 Safe operating area for TO-220

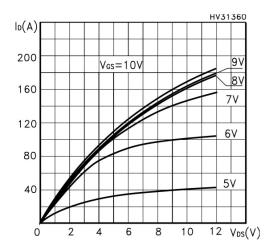


Fig.3 Output characterisics

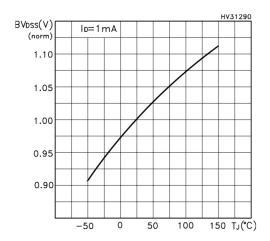


Fig.5 Normalized BVDSS vs temperature

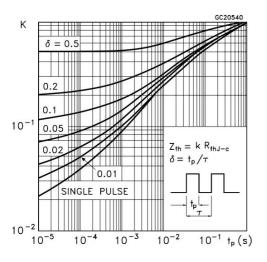


Fig.2 Thermal impedance for TO-220

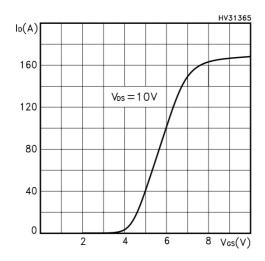


Fig.4 Transfer characteristics

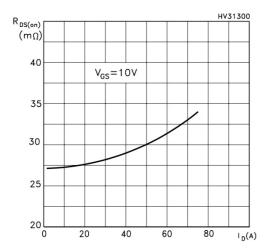


Fig.6 Static drain-source on resistance



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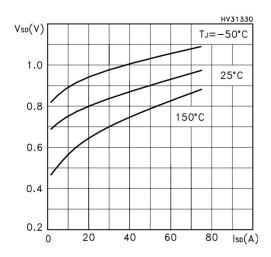


Fig.7 Source-drain diode forword characteristics

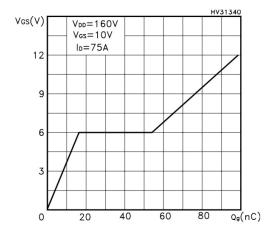


Fig.9 Gate charge vs gate-source voltage

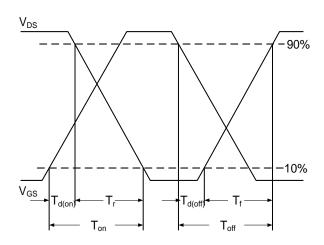


Fig.11 Switching Time Waveform

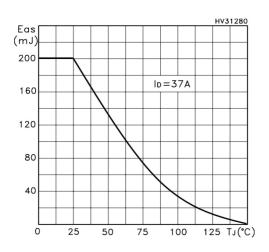


Fig.8 Avalanche energy vs starting Tj

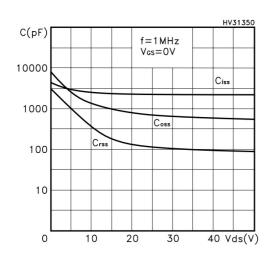


Fig.10 Capacitance variations

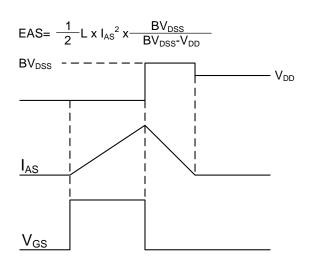
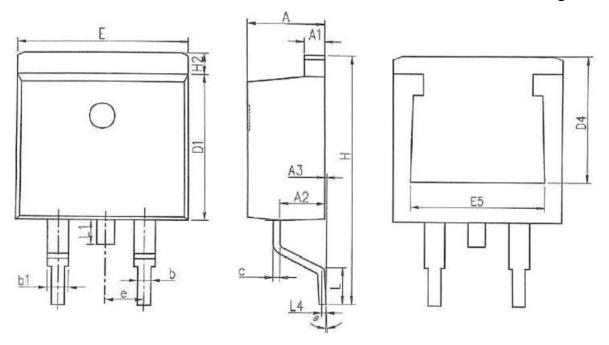


Fig.12 Unclamped Inductive Switching



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CVADOLO	MILLIM	IETERS	INCHES		
SYMBOLS	MIN	MAX	MIN	MAX	
Α	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	
С	0.300	0.530	0.012	0.021	
D1	8.500	9.300	0.335	0.366	
D4	6.600	-	0.260	-	
Е	9.860	10.36	0.388	0.408	
E5	7.060	-	0.278	-	
е	2.540 BSC		0.100 BSC		
Н	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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