STRH100N6FSY3

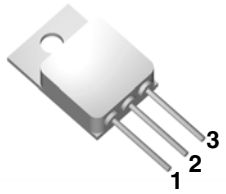
N-channel 60V - 0.012Ω - TO-254AA
Rad-hard low gate charge STripFET™ Power MOSFET

PRELIMINARY DATA

General features

Type	V_{DSS}
STRH100N6FSY3	60V

- Exceptional dv/dt capability
- 100% avalanche tested
- Application oriented characterization
- Hermetically sealed

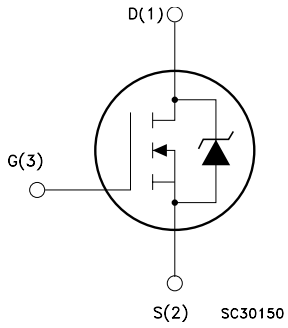


TO-254AA

Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to improve immunity to space effect. It is therefore suitable as power switch in mainly high-efficiency DC-DC converters. It is also intended for any application with low gate charge drive requirements.

Internal schematic diagram



Applications

- Satellite
- High reliability

Order codes

Part number	Marking	Package	Packaging
STRH100N6FSY1 (1)	RH100N6FSY1	TO-254AA	Individual strip pack
STRH100N6FSY2 (2)	RH100N6FSY2	TO-254AA	Individual strip pack
STRH100N6FSY3 (3)	RH100N6FSY3	TO-254AA	Individual strip pack

1. Mil temp range
2. Mil temp range + burn in
3. Space flights parts (full ESA flow screening)

1 Electrical ratings

Table 1. Absolute maximum ratings (pre-irradiation)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	60	V
V_{GS}	Gate-source voltage	±14	V
I_D (1)	Drain current (continuous) at T_C= 25°C	80	A
I_D (2)	Drain current (continuous) at T_C= 100°C	68	A
I_{DM} (3)	Drain current (pulsed)	384	A
P_{TOT} (2)	Total dissipation at T_C= 25°C	288	W
dv/dt (4)	Peak diode recovery voltage slope	2.5	V/ns
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Max. operating junction temperature	175	°C

1. This value is limited by package
2. This value is rated according to Rthj-case
3. Pulse width limited by safe operating area
4. $I_{SD} \leq 80A$, di/dt ≤ 600A/µs, $V_{DD} = 80\%V_{(BR)DSS}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	0.52	°C/W
Rthc-s	Case-to-sink typ	0.21	°C/W
Rthj-amb	Thermal resistance junction-amb max	48	°C/W

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by Tj max)	40	A
E_{AS}	Single pulse avalanche energy (starting Tj=25°C, Id=Iar, Vdd=32V)	1374	mJ
E_{AR}	Repetitive avalanche	53	mJ

2 Electrical characteristics

(T_{CASE} = 25°C unless otherwise specified)

2.1 Pre-irradiation

Table 4. On/off states

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	80% BV_{Dss}			10	µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±14V			±100	nA
BV_{DSS}	Drain-to-source breakdown voltage	V_{GS} = 0V, I_D = 1mA	60			V
$V_{GS(th)}$	Gate threshold voltage	V_{DS} =V_{GS}, I_D = 1mA	2		4.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 12V I_D = 40A		0.012		Ω

Table 5. Dynamic

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{GS} = 0V, V_{DS} = 25V, f=1MHz		6800 1128 395		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-to-source charge Gate-to-drain (“Miller”) charge	V_{DD} = 30V, I_D = 40A, V_{GS}=12V		178.5 32.6 53		nC nC nC
R_G	Gate input resistance	f=1MHz Gate DC Bias=0 Test signal level=20mV open drain		2		Ω

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off-delay time Fall time	V_{DD} = 30V, I_D = 40A, R_G = 4.7Ω, V_{GS} = 12V		32 98 128 80		ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD} (1) I_{SDM} (2)	Source-drain current Source-drain current (pulsed)				80 380	A A
V_{SD} (3)	Forward on voltage	I_{SD} = 80A, V_{GS} = 0		1.1		V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 80A, di/dt = 100A/µs V_{DD}= 30V, Tj = 25°C		432 3.5 26		ns µC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 80A, di/dt = 100A/µs V_{DD}= 30V, Tj = 150°C		528 4.9 30.8		ns µC A

1. This value is limited by package
2. Pulse width limited by safe operating area
3. Pulsed: pulse duration = 300µs, duty cycle 1.5%

2.2 Radiation characteristics

(@Tj=25°C up to 100Krad [a])

Table 8. On/off states

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	80% BV_{Dss}			10	µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±14V			±100	nA
BV_{DSS}	Drain-to-source breakdown voltage	V_{GS} = 0V, I_D = 1mA	60			V
$V_{GS(th)}$	Gate threshold voltage	V_{DS} =V_{GS}, I_D = 1mA	2		4.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 12V I_D = 40A		0.012		Ω

Table 9. Single event effect

Ion	Let (Mev/(mg/cm2))	Energy (MeV)	Let range (µm)	V_{DS}(V) @V_{GS}=0
Br	37	230	32	60

a. According to ESCC 22900 specification, Co60 gamma rays, dose rags:0.1rad/sec.

2.3 Electrical characteristics (curves)

Figure 1. Safe operating area

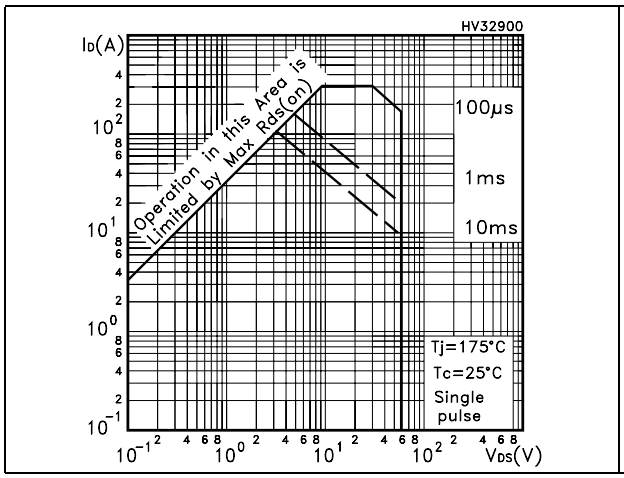


Figure 2. Thermal impedance

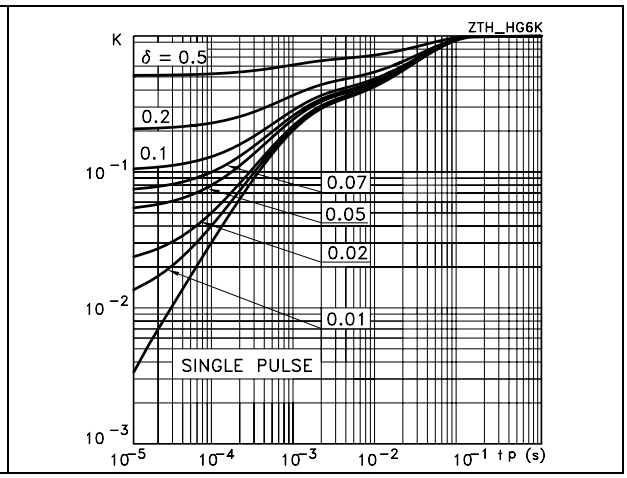


Figure 3. Output characteristics

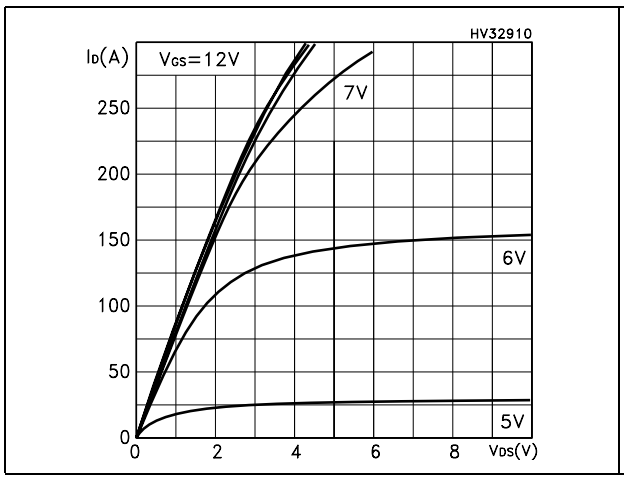


Figure 4. Transfer characteristics

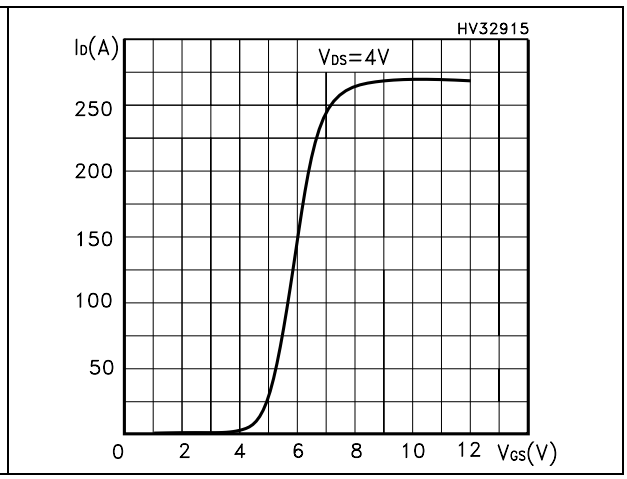


Figure 5. Gate charge vs gate-source voltage

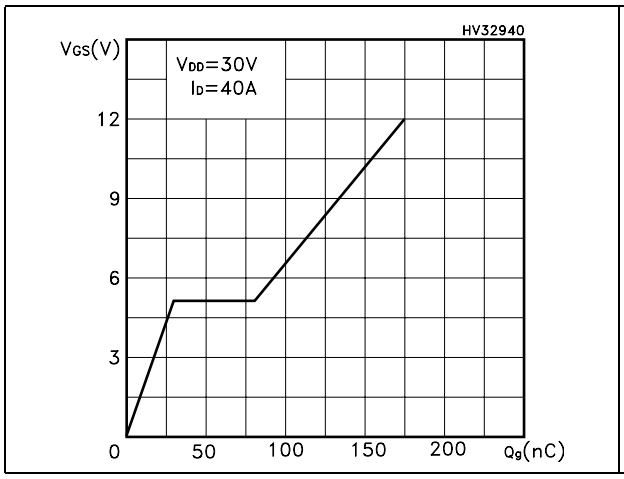


Figure 6. Capacitance variations

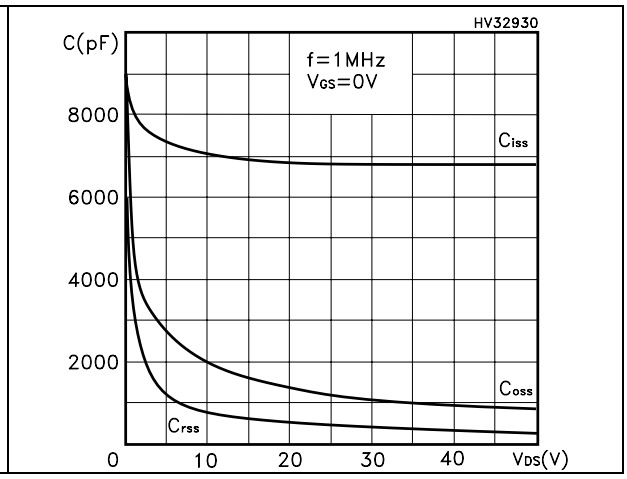


Figure 7. Normalized BV_{DSS} vs temperature

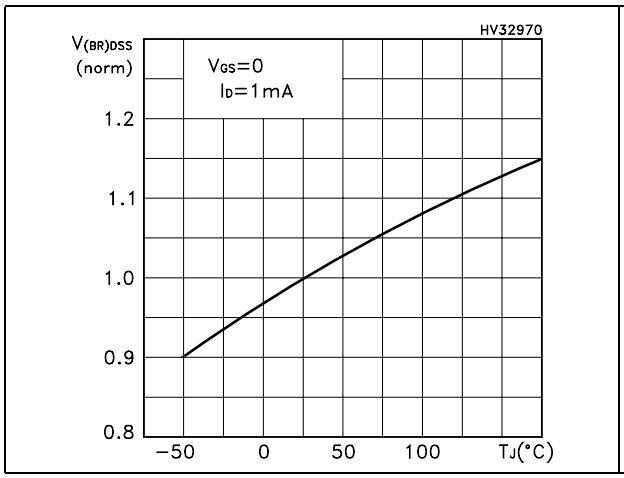


Figure 8. Static drain-source on resistance

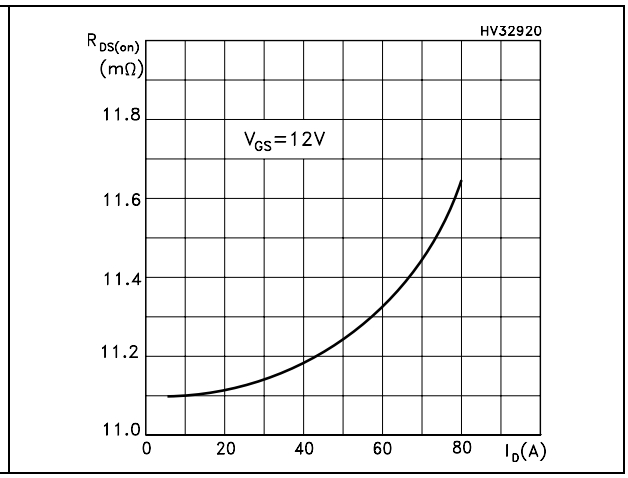


Figure 9. Normalized gate threshold voltage vs temperature

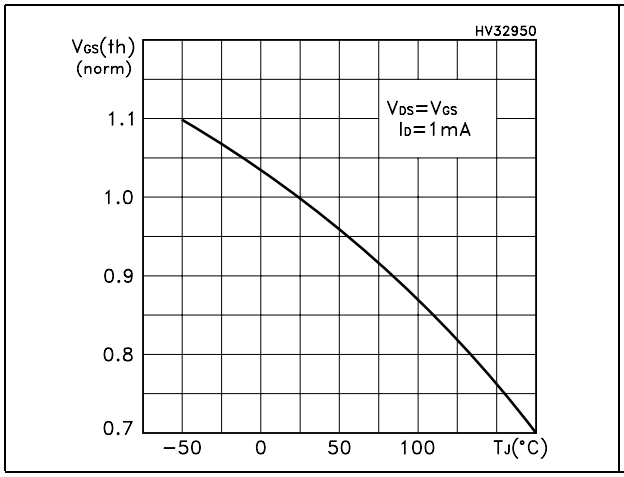


Figure 10. Normalized on resistance vs temperature

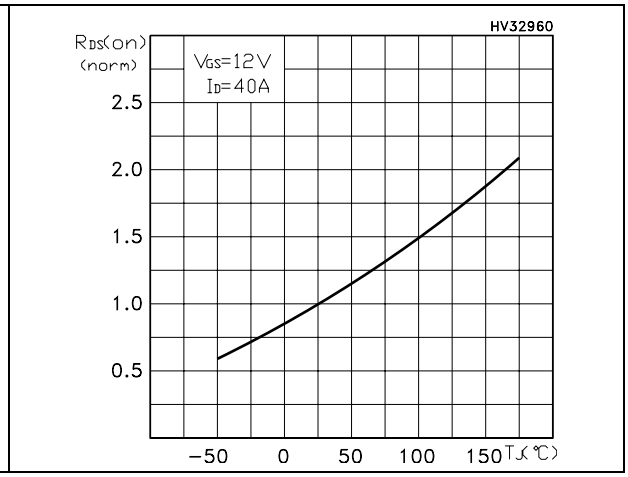
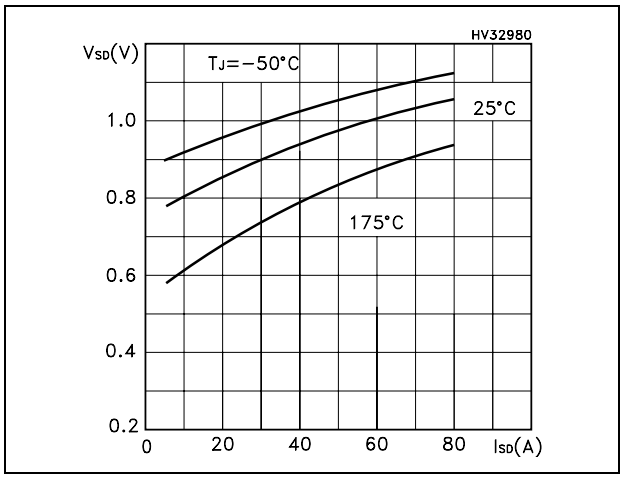


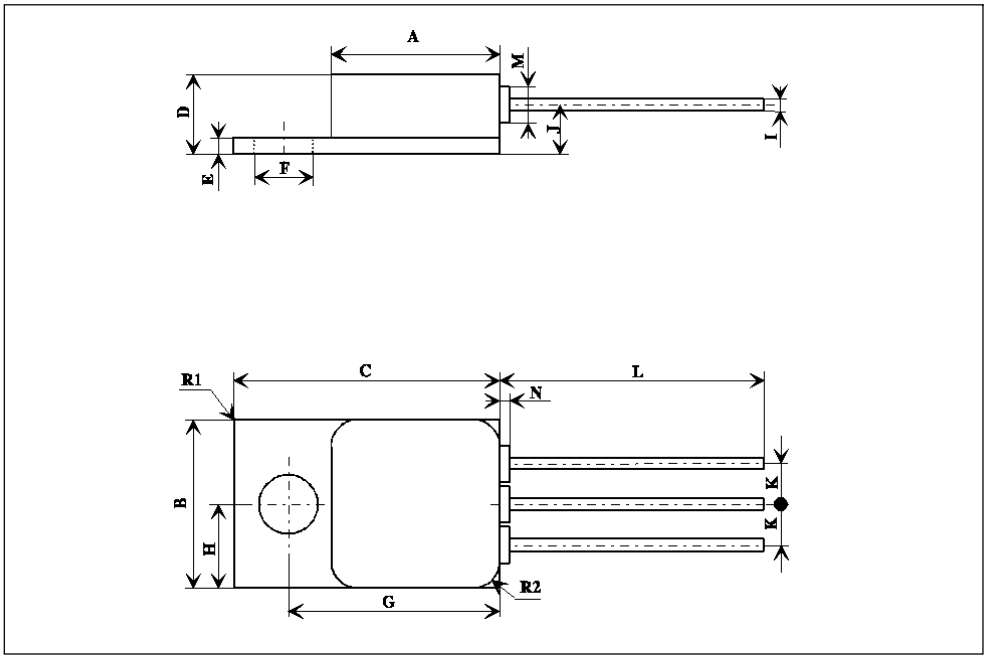
Figure 11. Sorce drain-diode forward characteristics



3 Package mechanical data

TO-254 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	13.59		13.84	0.535		0.545
B	13.59		13.84	0.535		0.545
C	20.07		20.32	0.790		0.80
D	6.32		6.60	0.249		0.260
E	1.02		1.27	0.040		0.050
F	3.53		3.78	0.139		0.149
G	16.89		17.40	0.665		0.685
H		6.86			0.270	
I	0.89		1.14	0.035		0.045
J		3.81			0.150	
K		3.81			0.150	
L	12.95		14.50	0.510		0.570
M		3.05			0.120	
N			0.71			0.025
R1			1.0			0.040
R2		1.65			0.065	



4 Revision history

Table 10. Revision history

Date	Revision	Changes
03-Jul-2006	1	First release

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