STRH100N10FSY3

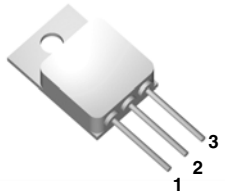
N-channel 100V - 0.024Ω - TO-254AA
Rad-hard low gate charge STripFET™ Power MOSFET

PRELIMINARY DATA

General features

Type	V_{DSS}
STRH100N10FSY3	100V

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

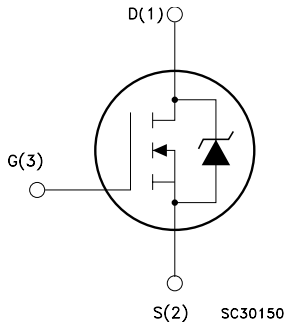


TO-254AA

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
STRH100N10FSY1 (1)	RH100N10FSY1	TO-254AA	Individual strip pack
STRH100N10FSY2 (2)	RH100N10FSY2	TO-254AA	Individual strip pack
STRH100N10FSY3 (3)	RH100N10FSY3	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)	100	V
V_{GS}	Gate-source voltage	±14	V
I_D (1)	Drain current (continuous) at T_C= 25°C	72	A
I_D (1)	Drain current (continuous) at T_C= 100°C	52	A
I_{DM} (2)	Drain current (pulsed)	288	A
P_{TOT} (1)	Total dissipation at T_C= 25°C	288	W
dv/dt (3)	Peak diode recovery voltage slope	3.7	V/ns
T_{stg}	Storage temperature	–55 to 175	°C
T_j	Max. operating junction temperature	175	°C

1. Rated according to the Rthj-case
2. Pulse width limited by safe operating area
3. $I_{SD} \leq 80A$, $di/dt \leq 1100A/\mu s$, $V_{DD} = 80\%V_{(BR)DSS}$

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, I_D=I_{AR}, V_{DD}=50V)	3810	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	100			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 = 36A		0.024		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		6600 710 210		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-to-source charge Gate-to-drain (“Miller”) charge	V_{DD} = 50V, I_D = 36A, V_{GS}=12V		180 25.4 46.2		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} = 50V, I_D = 40A, R_G = 4.7Ω, V_{GS} = 12V		37 60 115 58		ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Unit
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)				72 288	A A
V_{SD} (2)	Forward on voltage	I_{SD} = 72A, V_{GS} = 0			1.1	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 72A, di/dt = 100A/µs V_{DD}= 50V, Tj = 25°C		332 4.48 27		ns µC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 72A, di/dt = 100A/µs V_{DD}= 50V, Tj = 150°C		380 5.62 29.6		ns µC A

1. Pulse width limited by safe operating area
2. 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	100			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 = 36A		0.024		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	100

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

2.3 Electrical characteristics (curves)

Figure 1. Safe operating area

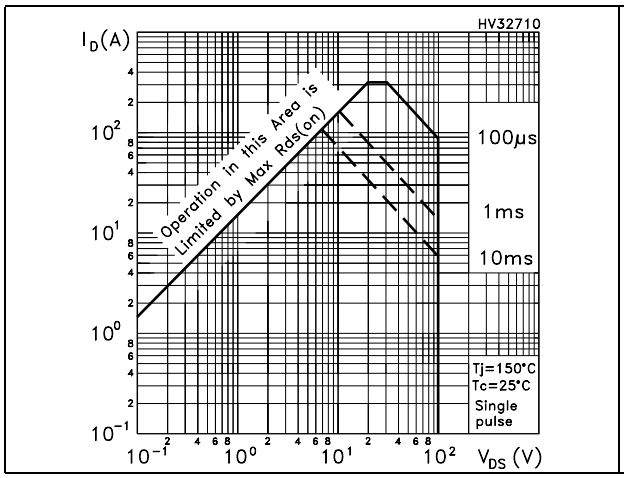


Figure 2. Thermal impedance

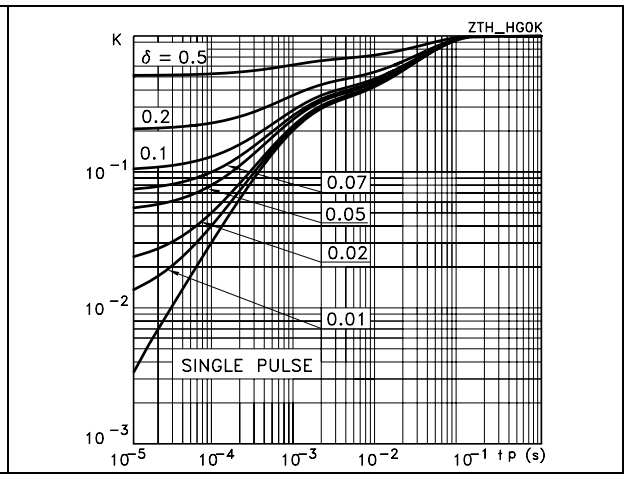


Figure 3. Output characteristics

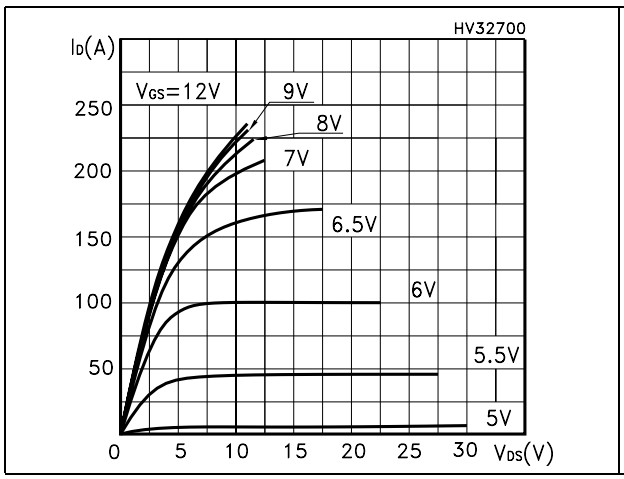


Figure 4. Transfer characteristics

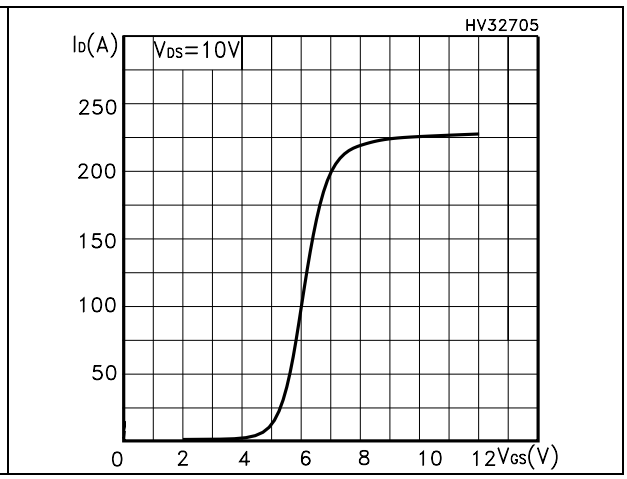


Figure 5. Gate charge vs gate-source voltage

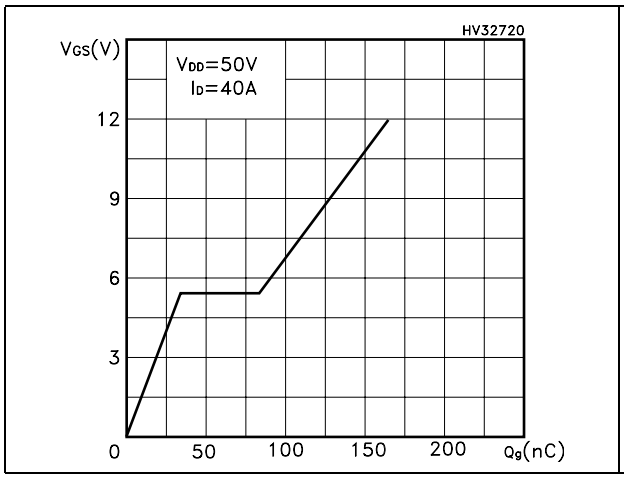


Figure 6. Capacitance variations

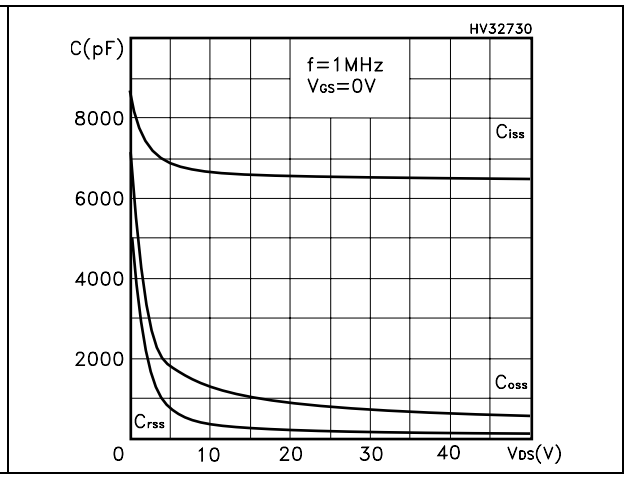


Figure 7. Normalized BV_{DSS} vs temperature

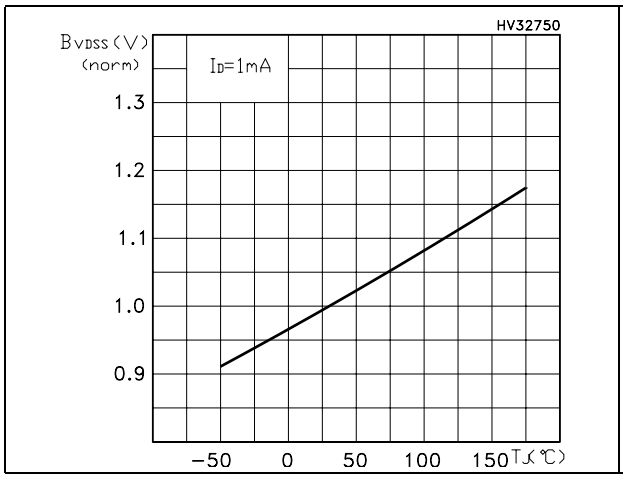


Figure 8. Static drain-source on resistance

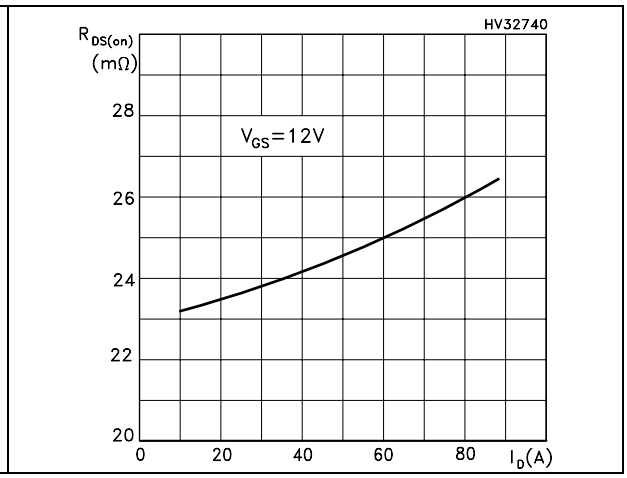


Figure 9. Normalized gate threshold voltage vs temperature

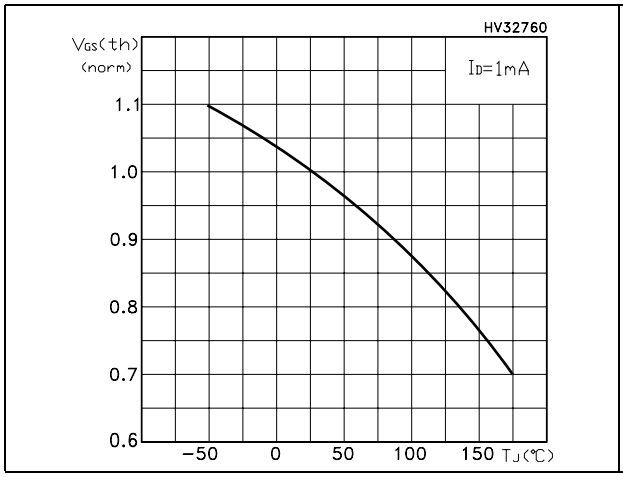


Figure 10. Normalized on resistance vs temperature

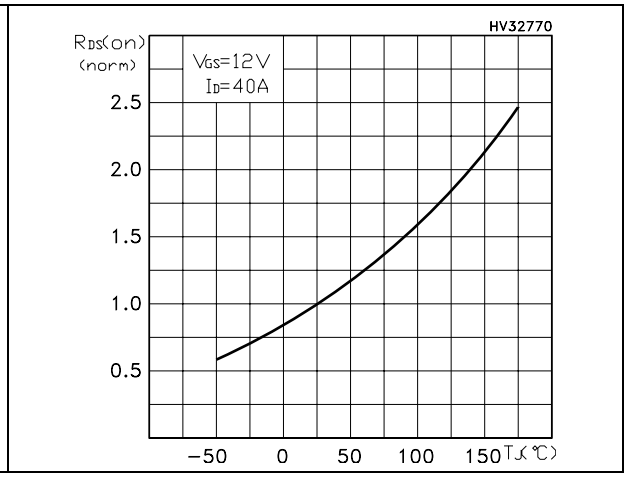
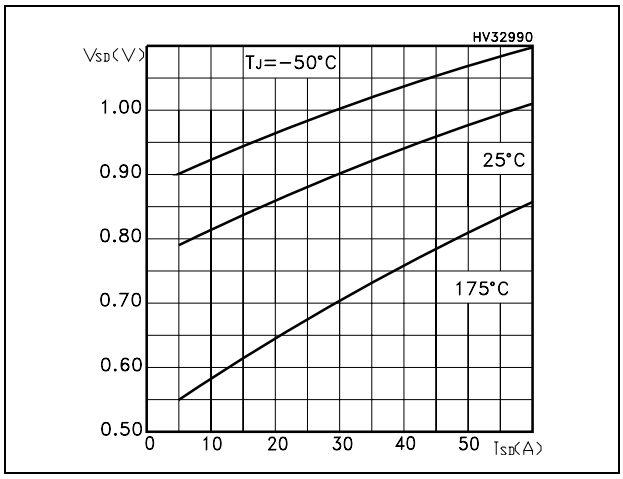


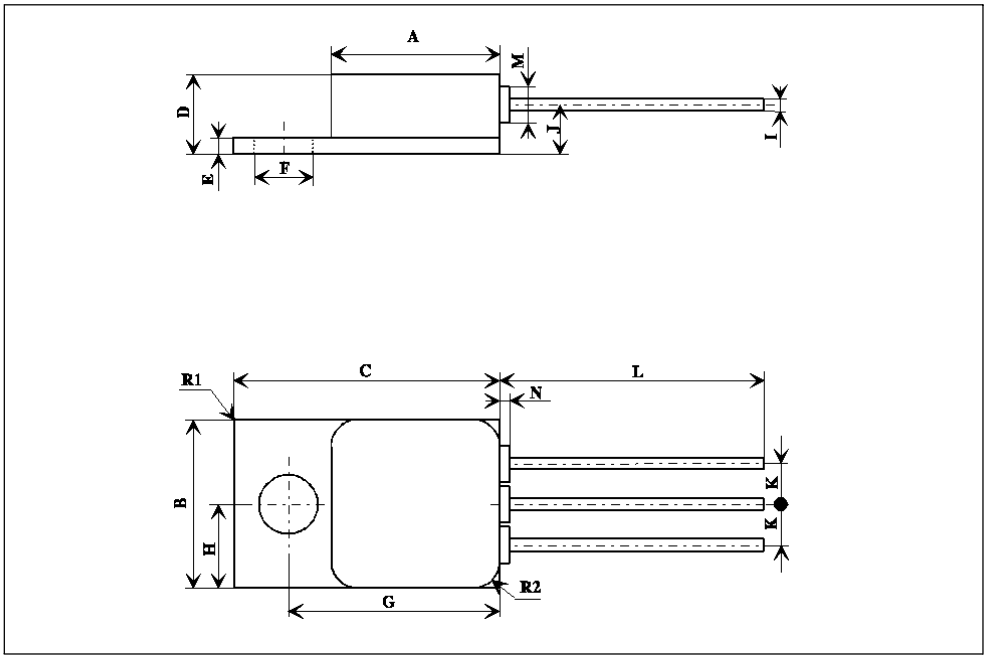
Figure 11. Sorce drain-diode forward characteristics



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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