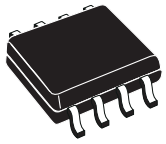
STS8C5H30L

N-channel 30V - 0.018 Ω - 8A/p-channel 30V - 0.045 Ω - 5A - SO-8
Low gate charge STripFET™ III MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STS8C5H30L(N-channel)	30V	<0.022	8A
STS8C5H30L(P-channel)	30V	<0.056	5A

- Conduction losses reduced
- Switching losses reduced
- Low threshold drive
- Standard outline for easy automated surface mount assembly

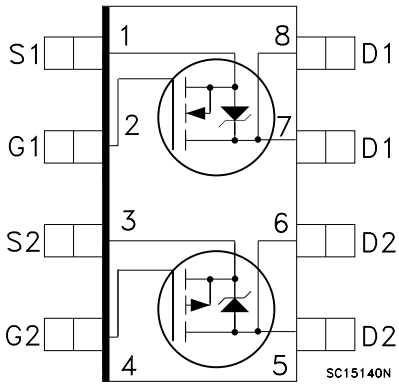


SO-8

Description

This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Figure 1. Internal schematic diagram



Application

- Switching application

Table 1. Device summary

Part number	Marking	Package	Packaging
STS8C5H30L	S8C5H30L	SO-8	Tape & reel

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		N-channel	P-channel	
V_{DS}	Drain-source voltage (v_{gs} = 0)	30		V
V_{GS}	Gate- source voltage	±16	±16	V
I_D	Drain current (continuos) at T_C = 25°C single operating	8	4.2	A
I_D	Drain current (continuos) at T_C = 100°C single operating	6.4	3.1	A
I_{DM} (1)	Drain current (pulsed)	32	16.8	A
P_{TOT}	Total dissipation at T_C = 25°C dual operating Total dissipation at T_C = 25°C single operating	1.6 2		W W
T_{stg}	Storage temperature	-55 to 150		°C
T_j	Operating junction temperature	150		°C

1. Pulse width limited by safe operating area

Table 3. Thermal data

$R_{thj\text{-}a}$	Thermal resistance junction-ambient single operating Thermal resistance junction-ambient dual operating	62.5 78	°C/W °C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	I_D = 250 µA, V_{GS} = 0	n-ch p-ch	30 30			V V
I_{DSS}	Zero gate voltage Drain current (V_{GS} = 0)	V_{DS} = Max rating	n-ch			1	µA
		V_{DS}=Max rating, T_C=125°C	p-ch			10	µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ±16V V_{GS} = ±16V	n-ch p-ch			±100 ±100	nA nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250µA	n-ch p-ch	1 1	 1.6	 2.5	V V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10V, I_D = 4A V_{GS} = 10V, I_D = 2.5A V_{GS} = 4.5V, I_D = 4A V_{GS} = 4.5V, I_D = 2.5A	n-ch p-ch n-ch p-ch		0.018 0.045 0.020 0.070	0.022 0.055 0.025 0.075	Ω Ω Ω Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} = 15V, I_D= 4A V_{DS} = 15V, I_D= 2.5A	n-ch p-ch		8.5 10		S S
C_{iss}	Input capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0	n-ch p-ch		857 1350		pF pF
C_{oss}	Output capacitance		n-ch p-ch		147 490		pF pF
C_{rss}	Reverse transfer capacitance		n-ch p-ch		20 130		pF pF
Q_g	Total gate charge	**N-channel** V_{DD}=24V I_D=8A V_{GS}=5V **P-channel** V_{DD} = 24V I_D = 4A V_{GS}= 5V *(see Figure 27)*	n-ch p-ch		7 12.5	10 16	nC nC
Q_{gs}	Gate-source charge		n-ch p-ch		2.5 5		nC nC
Q_{gd}	Gate-drain charge		n-ch p-ch		2.3 3		nC nC

1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5.

Note: For the P-channel MOSFET actual polarity of voltages and current has to be reversed

Table 6. Switching times

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	**N-channel** V_{DD} = 15V, I_D = 4A R_G=4.7 Ω, V_{GS} = 4.5V **P-channel** V_{DD} = 15V, I_D = 2A R_G=4.7 Ω, V_{GS} = 4.5V *(see Figure 26)*	n-ch p-ch n-ch p-ch		12 25 14.5 35		ns ns ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	**N-channel** V_{DD} = 15V, I_D = 4A R_G=4.7 Ω, V_{GS} = 4.5V **P-channel** V_{DD} = 15V, I_D = 2A R_G=4.7 Ω, V_{GS} = 4.5V *(see Figure 26)*	n-ch p-ch n-ch p-ch		23 125 8 35		ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions		Min	Typ.	Max	Unit
I_{SD}	Source-drain current		n-ch p-ch			8 5	A A
I_{SDM} (1)	Source-drain current (pulsed)		n-ch p-ch			32 20	A A
V_{SD} (2)	Forward on voltage	I_{SD} = 8A, V_{GS} = 0 I_{SD} = 5A, V_{GS} = 0	n-ch p-ch			1.5 1.2	V V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	**N-channel** I_{SD} = 8A, di/dt = 100A/µs V_{DD}=15 V,T_j =150 °C **P-channel** I_{SD} = 5 A, di/dt = 100A/µs V_{DD}=15 V, T_j =150 °C *(see Figure 28)*	n-ch p-ch n-ch p-ch n-ch p-ch		15 45 5.7 36 0.76 1.6		ns ns nC nC A A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300 µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area n-ch

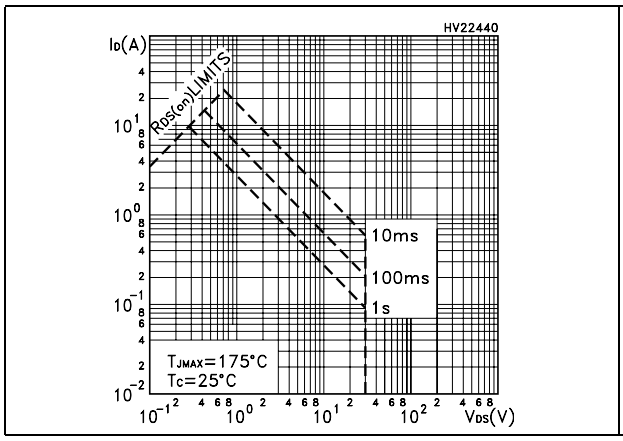


Figure 3. Thermal impedance n-ch

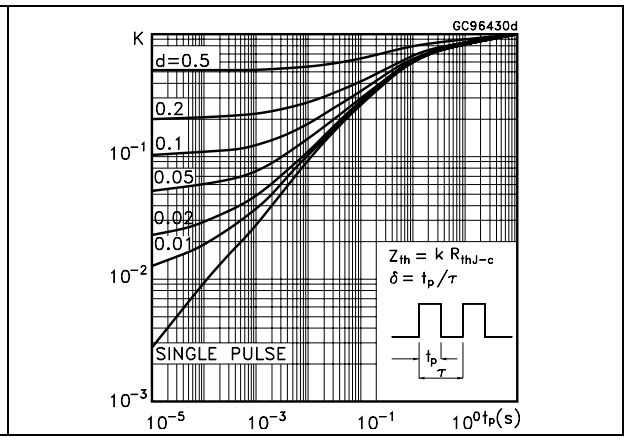


Figure 4. Output characteristics n-ch

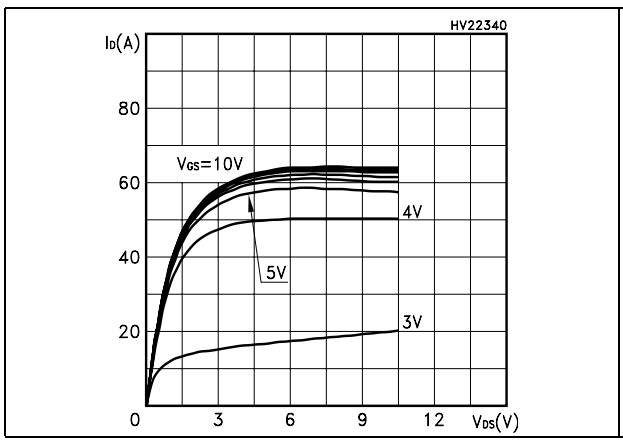


Figure 5. Transfer characteristics n-ch

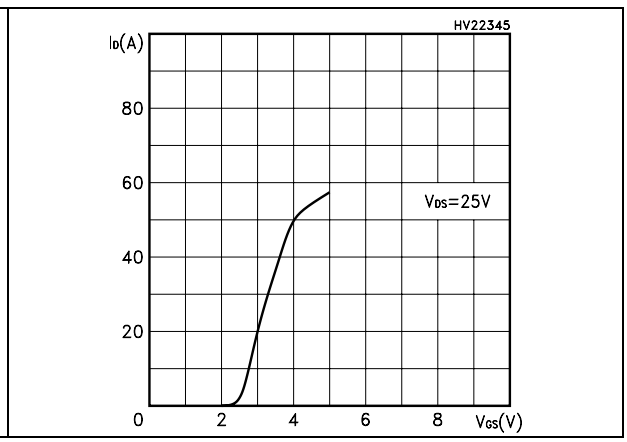


Figure 6. Transconductance n-ch

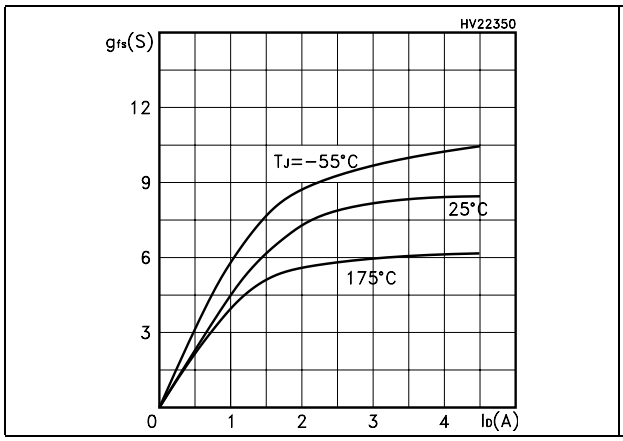


Figure 7. Static drain-source on resistance n-ch

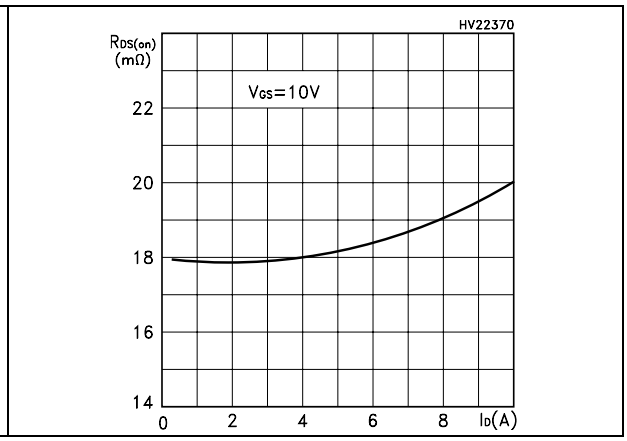


Figure 8. Gate charge vs. gate-source voltage n-ch

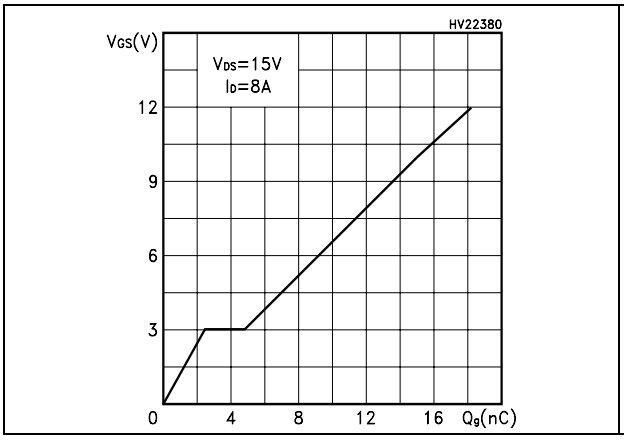


Figure 9. Capacitance variations n-ch

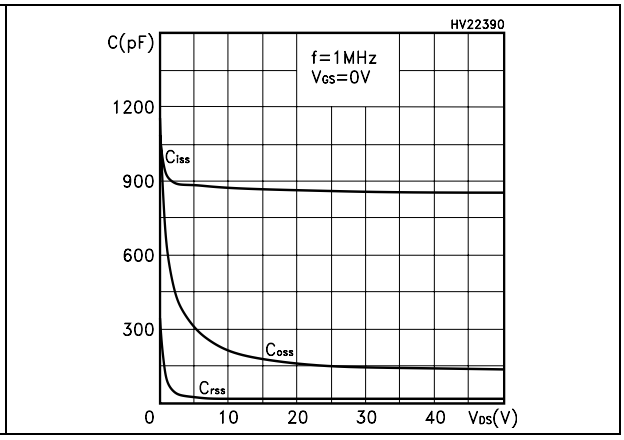


Figure 10. Normalized gate threshold voltage vs. temperature n-ch

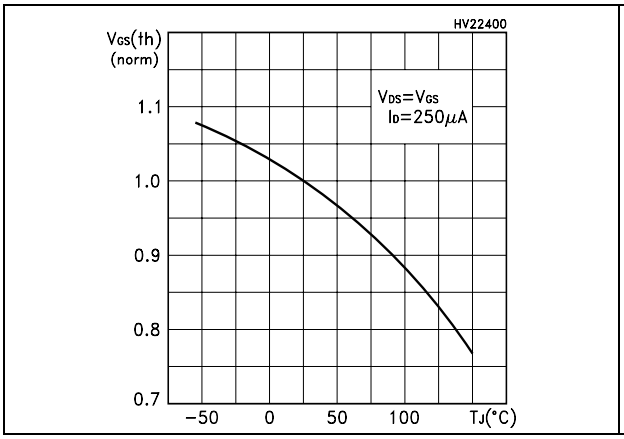


Figure 11. Normalized on resistance vs. temperature n-ch

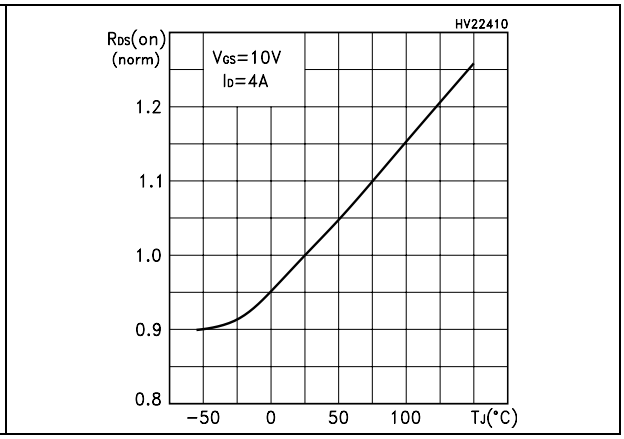


Figure 12. Source-drain diode forward characteristics n-ch

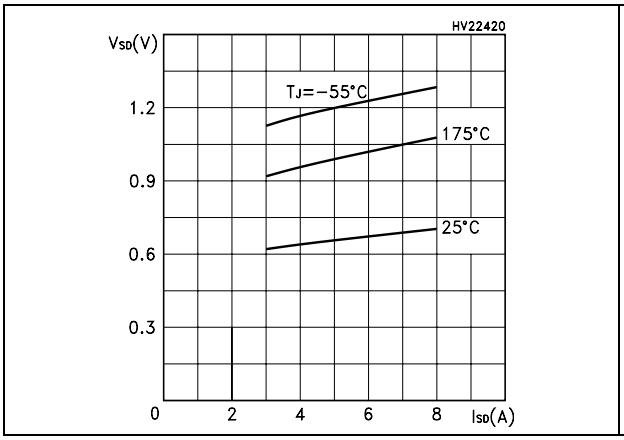


Figure 13. Normalized breakdown voltage vs. temperature n-ch

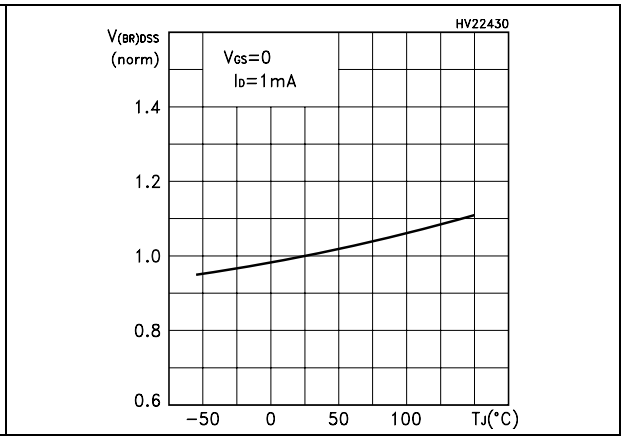


Figure 14. Safe operating area p-ch

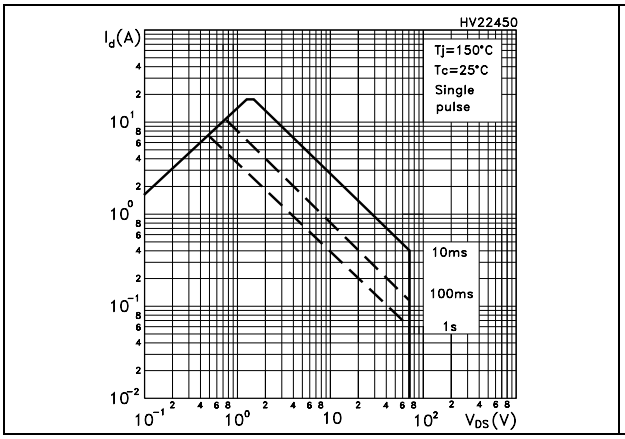


Figure 15. Thermal impedance p-ch

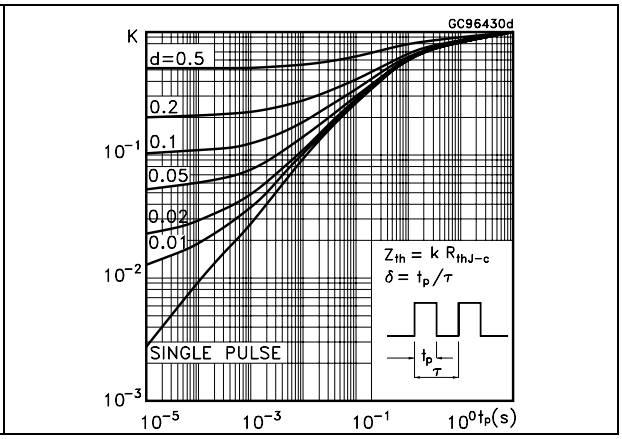


Figure 16. Output characteristics p-ch

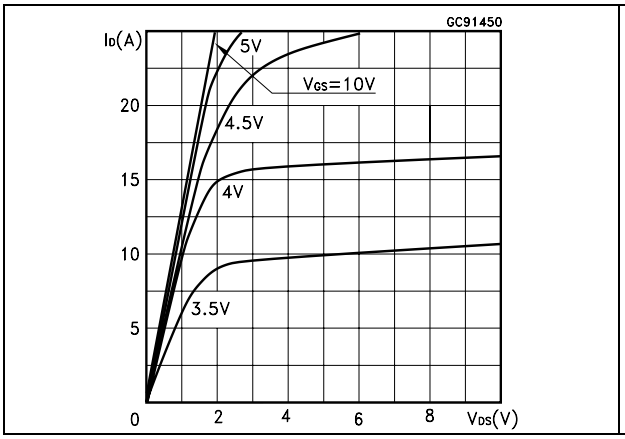


Figure 17. Transfer characteristics p-ch

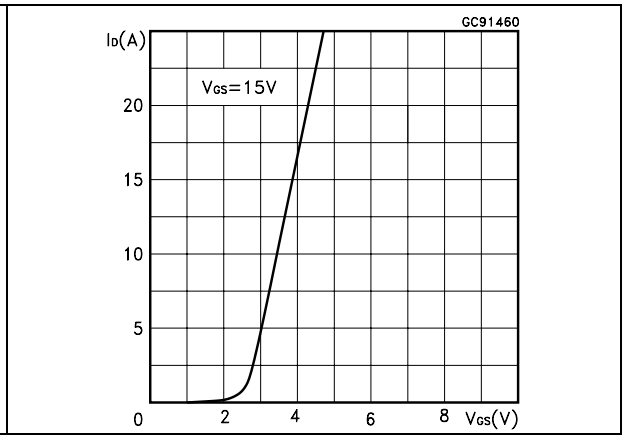


Figure 18. Transconductance p-ch

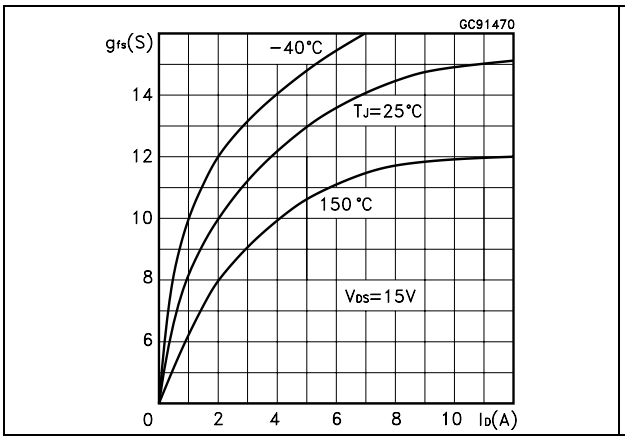


Figure 19. Static drain-source on resistance p-ch

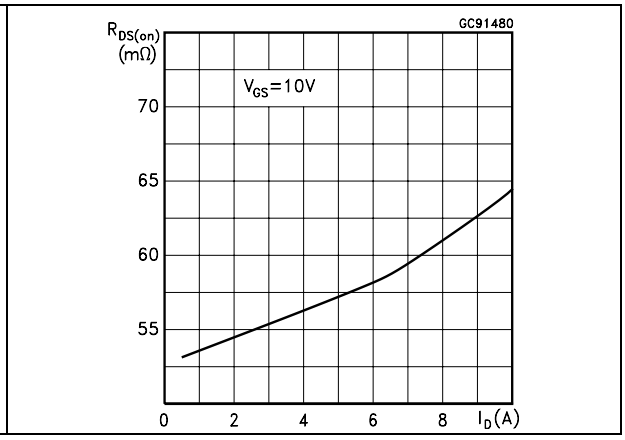


Figure 20. Gate charge vs. gate-source voltage p-ch

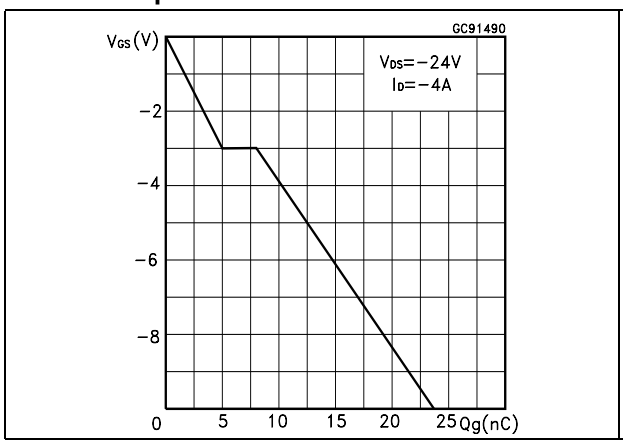


Figure 21. Capacitance variations p-ch

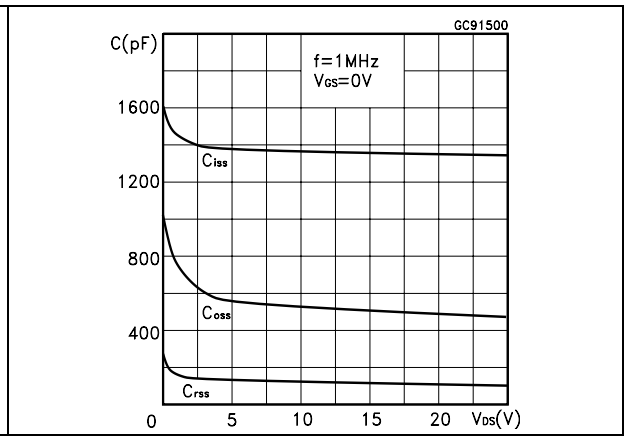


Figure 22. Normalized gate threshold voltage vs. temperature p-ch

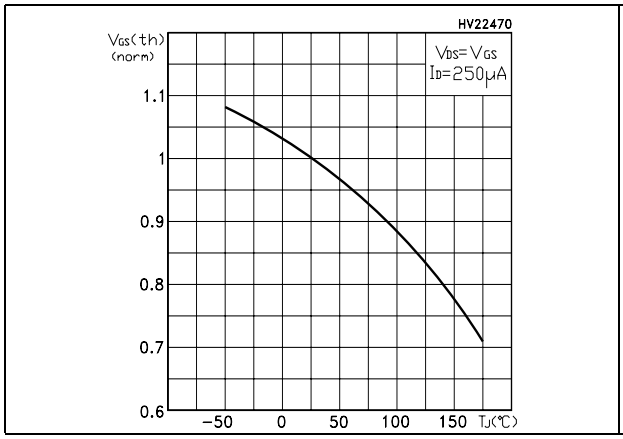


Figure 23. Normalized on resistance vs. temperature p-ch

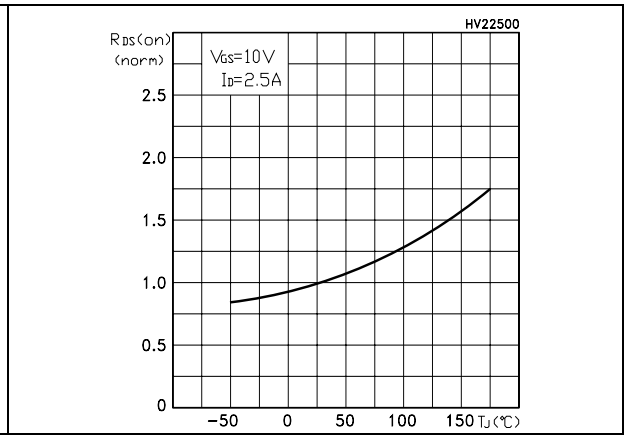


Figure 24. Source-drain diode forward characteristics p-ch

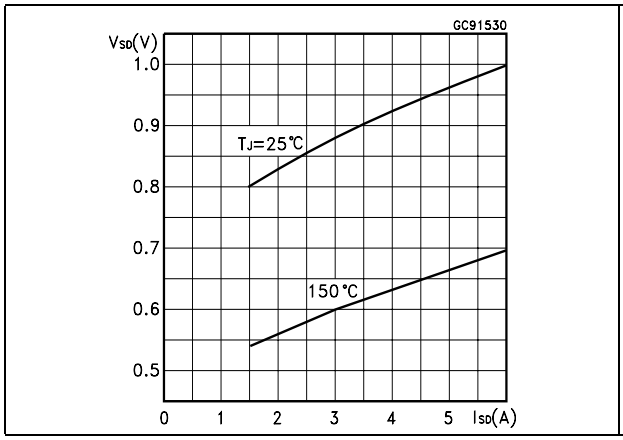
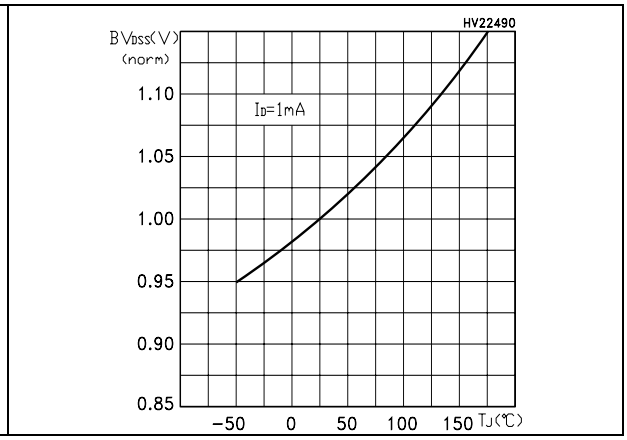


Figure 25. Normalized breakdown voltage vs. temperature p-ch



3 Test circuit

Figure 26. Switching times test circuit for resistive load

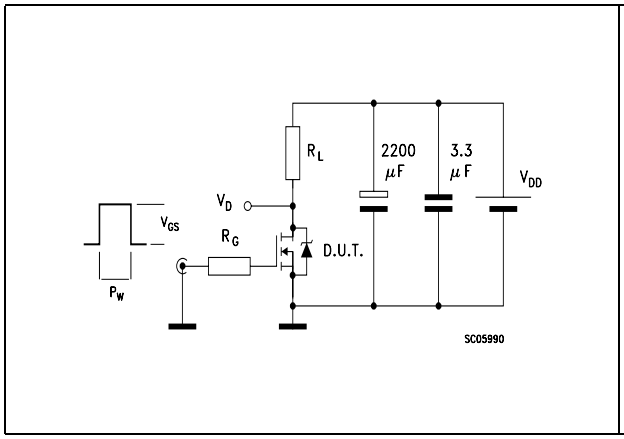


Figure 27. Gate charge test circuit

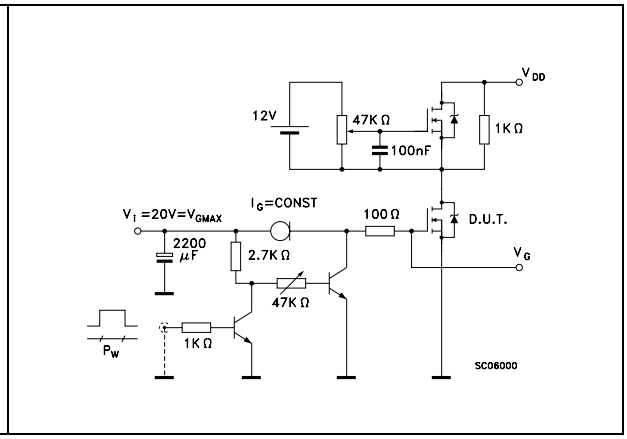


Figure 28. Test circuit for inductive load switching and diode recovery times

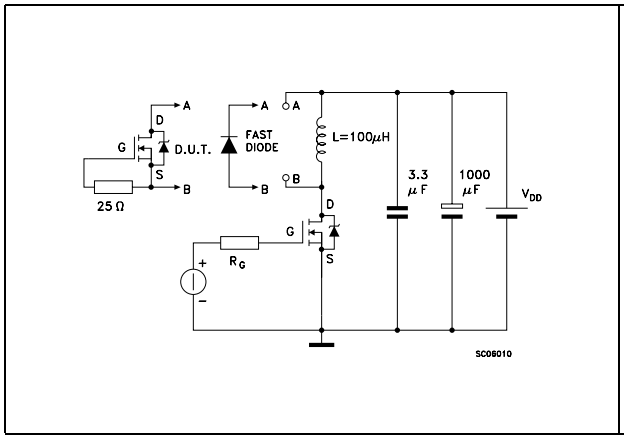


Figure 29. Unclamped Inductive load test circuit

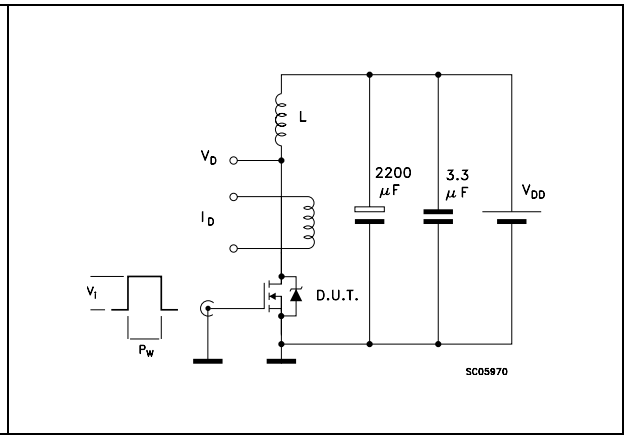


Figure 30. Unclamped inductive waveform

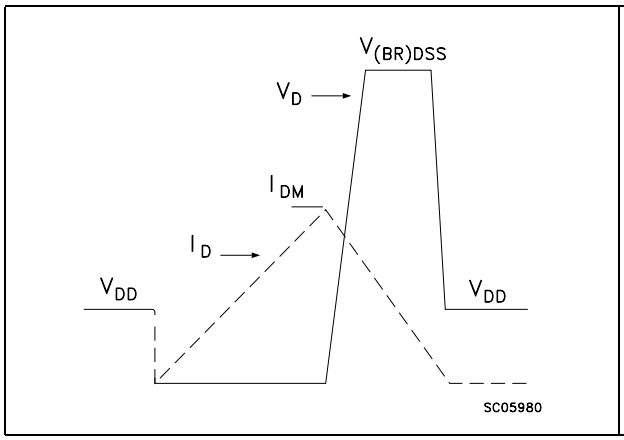
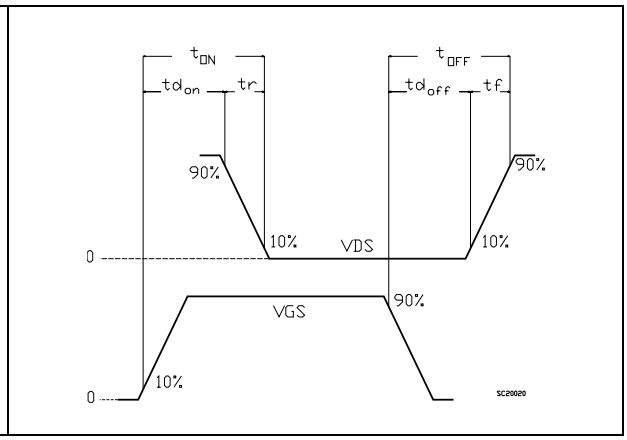


Figure 31. Switching time waveform

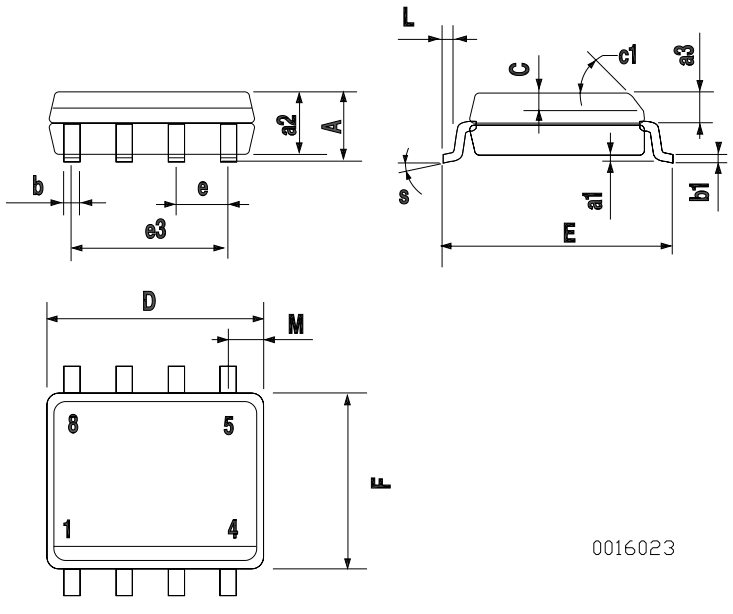


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: *www.st.com*

SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



5 Revision history

Table 8. Revision history

Date	Revision	Changes
17-Sep-2004	1	First revision
31-Oct-2006	2	The document has been reformatted
30-Jan-2007	3	typo mistake on *Table 2*.
23-Jul-2007	4	*Figure 14* has been updated

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