



## STS3C2F100

N-channel 100V - 0.110  $\Omega$  - 3A SO-8  
Complementary pair STripFET™ Power MOSFET

### General features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS3C2F100(N-channel)	100V	<0.145	3.0A
STS3C2F100(P-channel)	100V	<0.380	1.5A

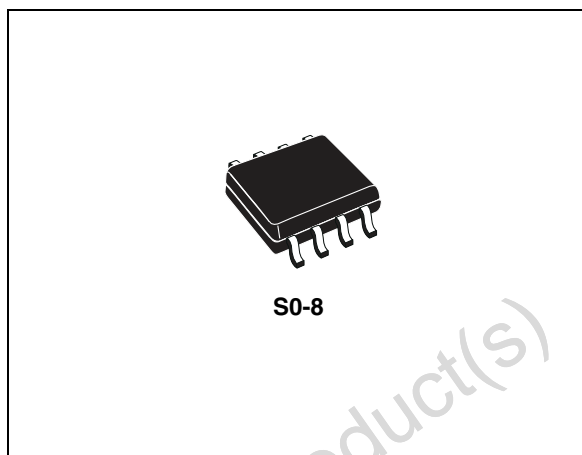
- Standard outline for easy automated surface mount assembly
- Ultra low gate charge
- Ultra low on-resistance

### Description

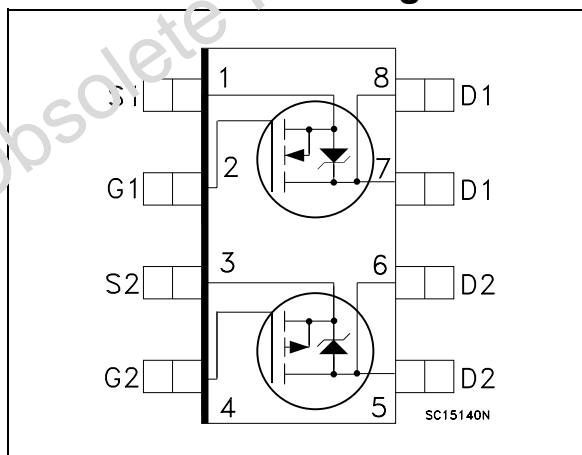
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

### Applications

- Switching application



### Internal schematic diagram



### Order codes

Part number	Marking	Package	Packaging
STS3C2F100	S3C2F100	SO-8	Tape & reel

# Contents

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Obsolete Product(s) - Obsolete Product(s)

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value		Unit
$V_{DS}$	Drain-source voltage ( $v_{GS} = 0$ )	100		V
$V_{GS}$	Gate- source voltage	$\pm 20$		V
$I_D$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	3.0	1.5	A
$I_D$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	1.9	1.0	A
$I_{DM}^{(1)}$	Drain current (pulsed)	12	6	A
$P_{TOT}$	Total dissipation at $T_C = 25^\circ\text{C}$	2		W
$T_{stg}$	Storage temperature	-55 to 150		$^\circ\text{C}$
$T_j$	Max. operating junction temperature	150		$^\circ\text{C}$

1. Pulse width limited by safe operating area

**Table 2. Thermal data**

$R_{thj-a}^{(1)}$	Thermal resistance junction-ambient	62.5	$^\circ\text{C}/\text{W}$
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1. When mounted on 1 in<sup>2</sup> pad of 2 oz. copper,  $t \leq 10$  sec

## 2 Electrical characteristics

( $T_{CASE}=25^{\circ}C$  unless otherwise specified)

**Table 3. On/off states**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$V_{(BR)DS}$ S	Drain-source Breakdown voltage	$I_D = 250 \mu A, V_{GS} = 0$	n-ch p-ch	100			V
$I_{DSS}$	Zero gate voltage Drain current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max rating}$ $V_{DS} = \text{Max rating},$ $T_C = 125^{\circ}C$	n-ch p-ch			1 10	$\mu A$ $\mu A$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20V$	n-ch p-ch			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	n-ch p-ch	2			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10V, I_D = 1.5A$ $V_{GS} = 10V, I_D = 1.0A$	n-ch p-ch		0.110 0.320	0.145 0.380	$\Omega$ $\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 20 V, I_D = 1.5 A$ $V_{DS} = 30 V, I_D = 1.0 A$	n-ch p-ch		3 4		S S
$C_{iss}$	Input capacitance	$V_{DS} = 25V, f = 1 \text{ MHz},$ $V_{GS} = 0$	n-ch p-ch		460 705		pF pF
$C_{oss}$	Output capacitance		n-ch p-ch		70 83		pF pF
$C_{rss}$	Reverse transfer capacitance		n-ch p-ch		30 30		pF pF
$Q_g$	Total gate charge	<b>N-channel</b> $V_{DD} = 80V, I_D = 3A$ <b>P-channel</b> $V_{GS} = 10V$	n-ch p-ch		15 20	20 27	nC nC
$Q_{gs}$	Gate-source charge		n-ch p-ch		3.7 2.0		nC nC
$Q_{gd}$	Gate-drain charge	$V_{DD} = 80V, I_D = 1.5A$ $V_{GS} = 10V$	n-ch p-ch		4.7 6.0		nC nC

1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 .

**Table 5. Switching times**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on delay time Rise time	<b>N-channel</b> $V_{DD} = 50\text{ V}$ , $I_D = 1.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$	n-ch		16		ns
			p-ch		14		ns
		<b>P-channel</b> $V_{DD} = 50\text{ V}$ , $I_D = 1.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ (see Figure 25)	n-ch		25		ns
			p-ch		20		ns
$t_{d(off)}$ $t_f$	Turn-off delay time Fall time	<b>N-channel</b> $V_{DD} = 50\text{ V}$ , $I_D = 1.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$	n-ch		32		ns
			p-ch		33		ns
		<b>P-channel</b> $V_{DD} = 50\text{ V}$ , $I_D = 1.5\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ (see Figure 25)	n-ch		20		ns
			p-ch		7.5		ns

**Table 6. Source drain diode**

Symbol	Parameter	Test conditions		Min	Typ.	Max	Unit
$I_{SD}$	Source-drain current		n-ch			3.0	A
			p-ch			1.5	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		n-ch			12	A
			p-ch			6.0	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 3\text{ A}$ , $V_{GS} = 0$ $I_{SD} = 1.5\text{ A}$ , $V_{GS} = 0$	n-ch			1.2	V
			p-ch			1.2	V
$t_{rr}$	Reverse recovery time	<b>N-channel</b> $I_{SD} = 3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 50\text{ V}$ , $T_j = 150\text{ }^\circ\text{C}$	n-ch		90		ns
			p-ch		65		ns
$Q_{rr}$	Reverse recovery charge	<b>P-channel</b> $I_{SD} = 1.5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 50\text{ V}$ , $T_j = 150\text{ }^\circ\text{C}$	n-ch		230		nC
			p-ch		175		nC
$I_{RRM}$	Reverse recovery current		n-ch		5.0		A
			p-ch		5.4		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area n-ch

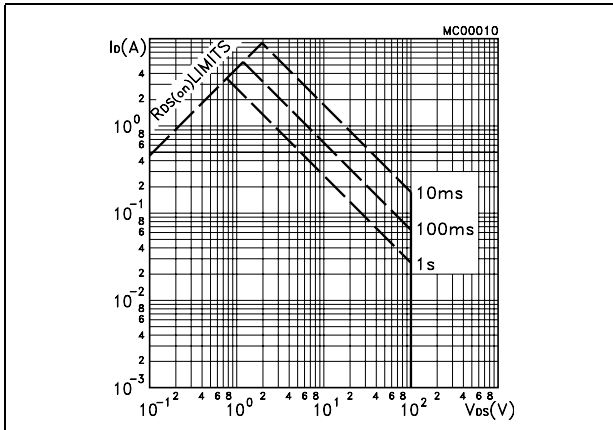


Figure 2. Thermal impedance n-ch

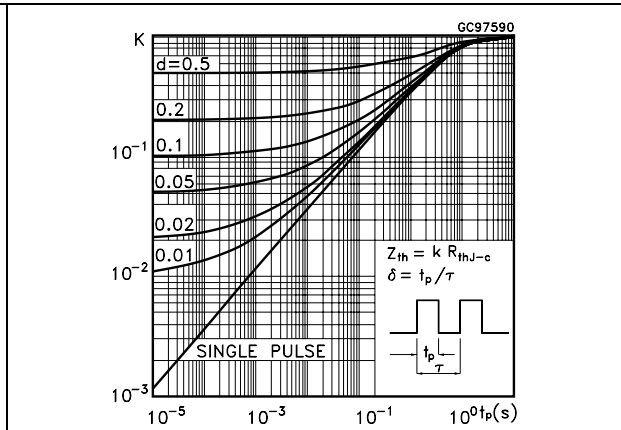


Figure 3. Output characteristics n-ch

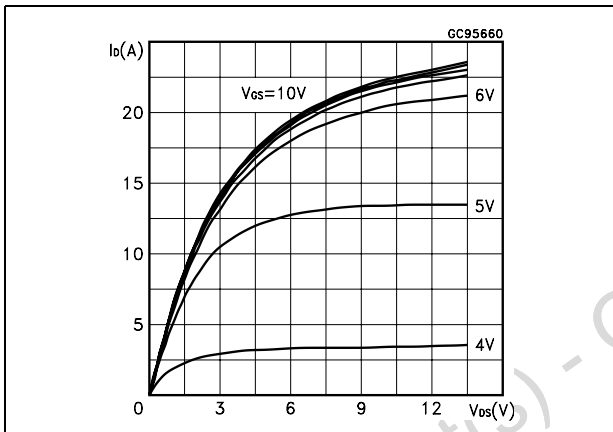


Figure 4. Transfer characteristics n-ch

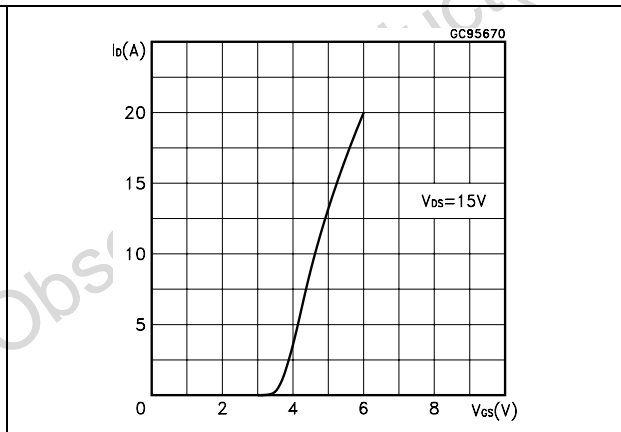


Figure 5. Transconductance n-ch

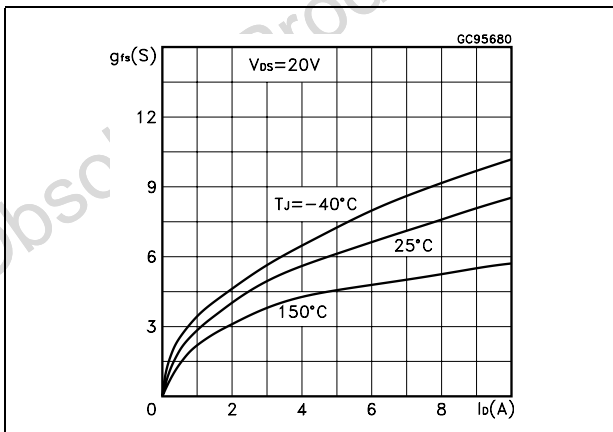
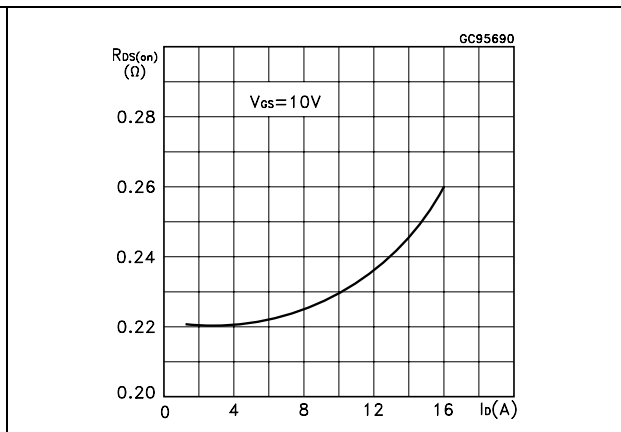
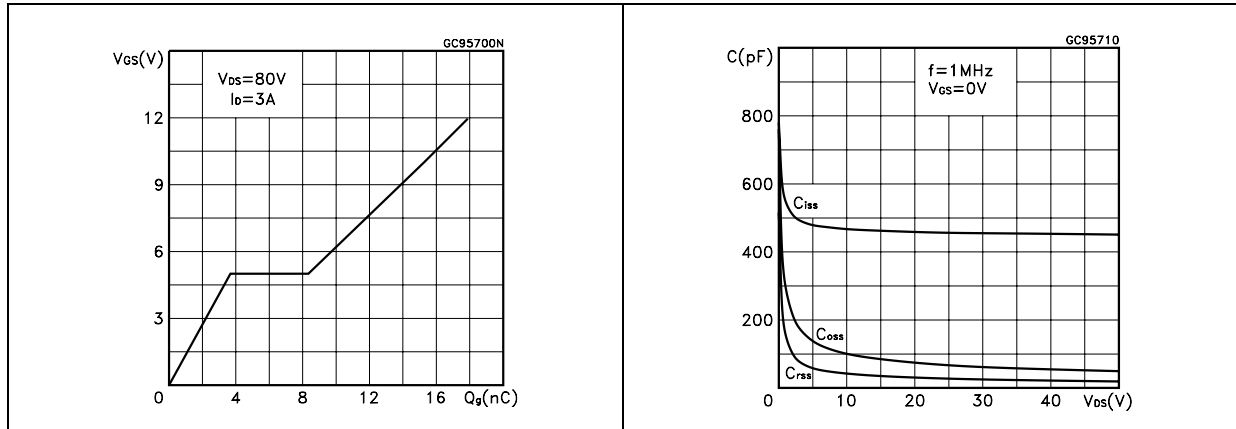


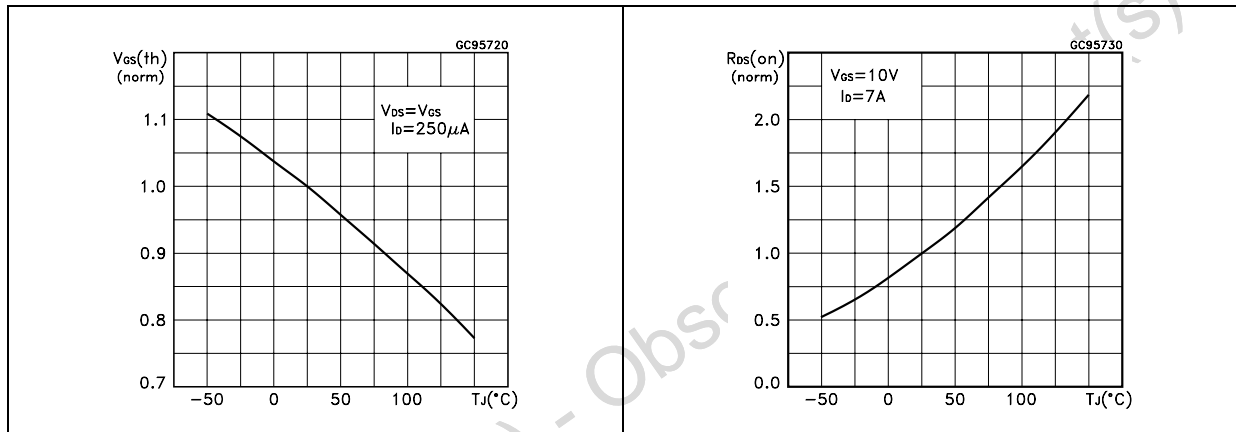
Figure 6. Static drain-source on resistance n-ch



**Figure 7. Gate charge vs gate-source voltage n-ch**      **Figure 8. Capacitance variations n-ch**



**Figure 9. Normalized gate threshold voltage vs temperature n-ch**      **Figure 10. Normalized on resistance vs temperature n-ch**



**Figure 11. Source-drain diode forward characteristics n-ch**      **Figure 12. Normalized breakdown voltage vs temperature n-ch**

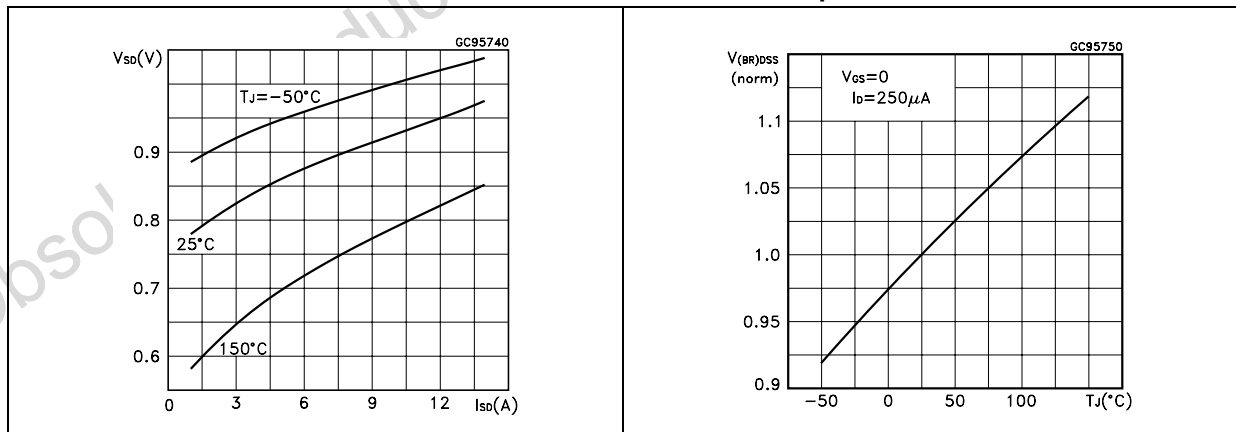


Figure 13. Safe operating area p-ch

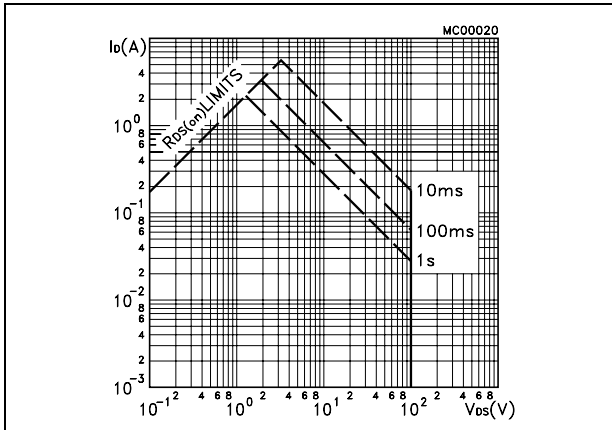


Figure 14. Thermal impedance p-ch

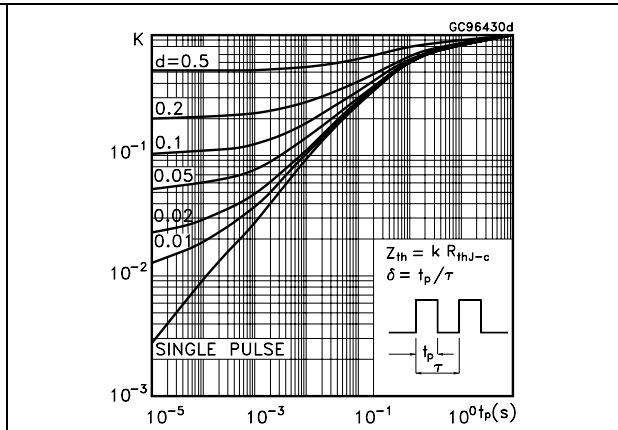


Figure 15. Output characteristics p-ch

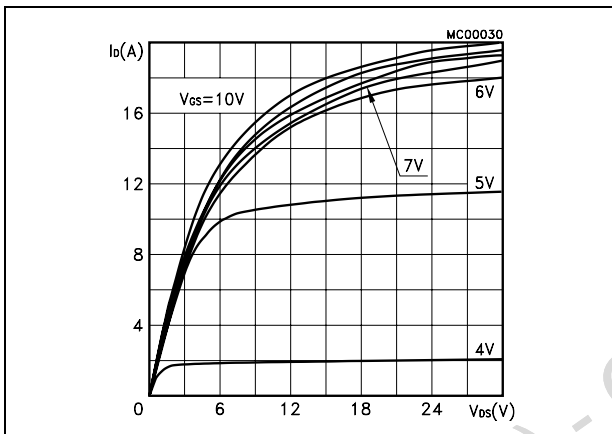


Figure 16. Transfer characteristics p-ch

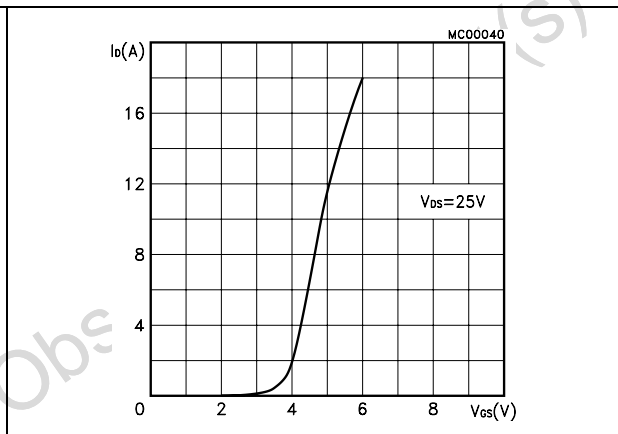


Figure 17. Transconductance p-ch

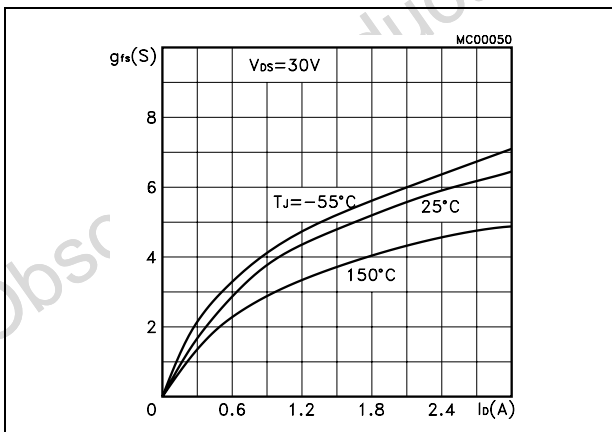


Figure 18. Static drain-source on resistance p-ch

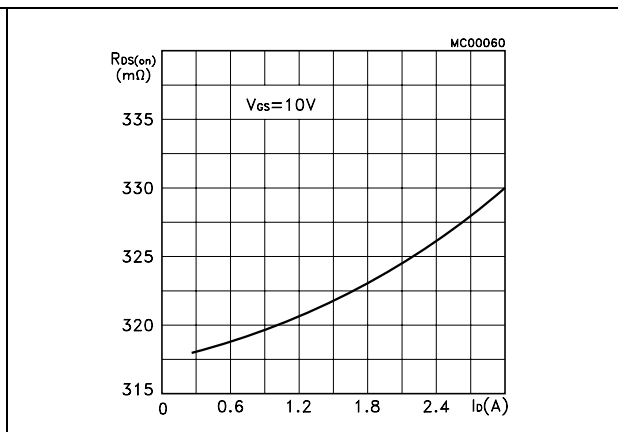




Figure 19. Gate charge vs gate-source voltage p-ch      Figure 20. Capacitance variations p-ch

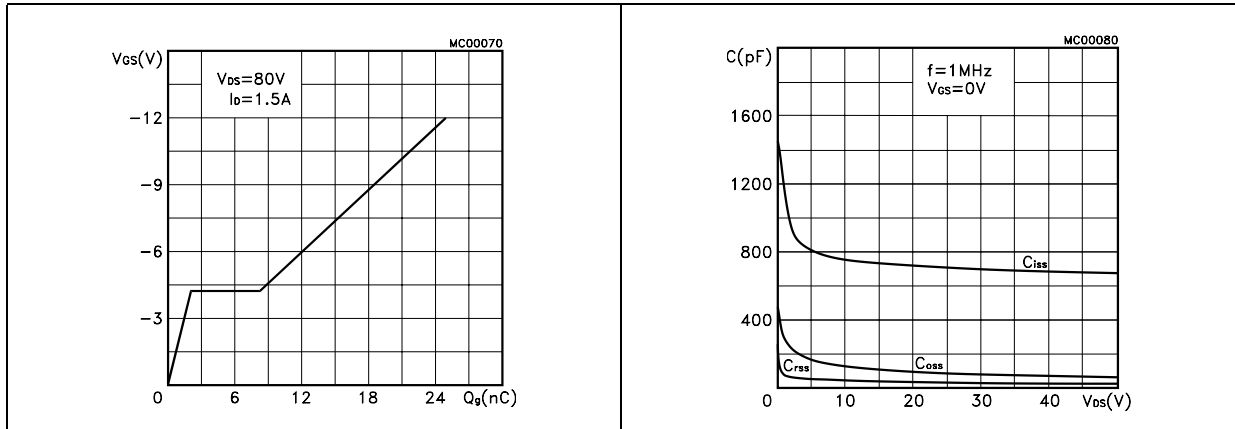


Figure 21. Normalized gate threshold voltage vs temperature p-ch      Figure 22. Normalized on resistance vs temperature p-ch

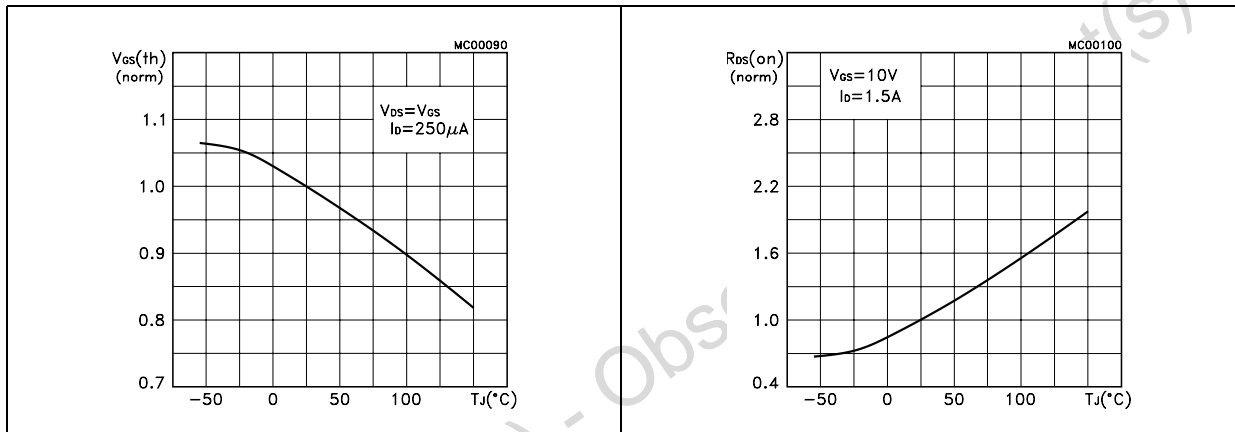
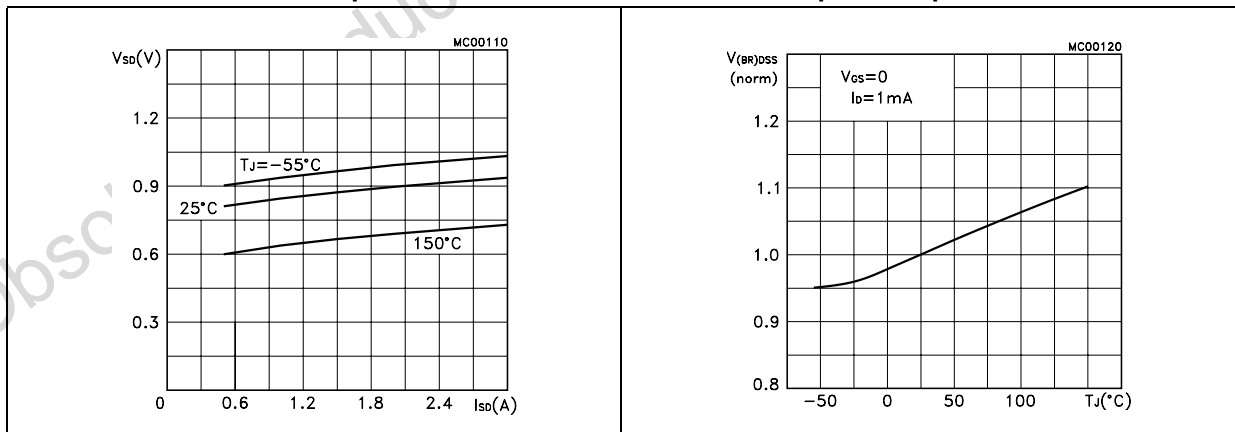


Figure 23. Source-drain diode forward characteristics p-ch      Figure 24. Normalized breakdown voltage vs temperature p-ch



### 3 Test circuit

Figure 25. Switching times test circuit for resistive load

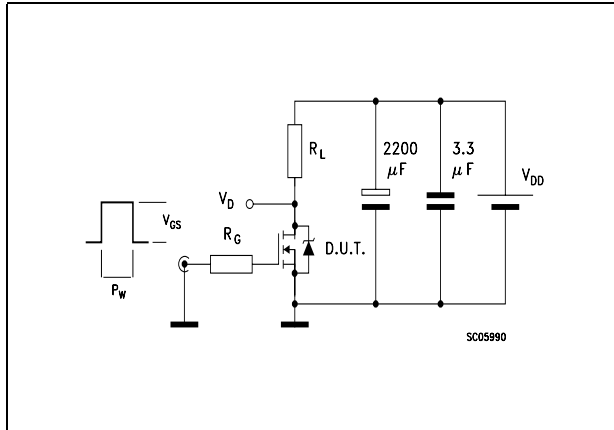


Figure 26. Gate charge test circuit

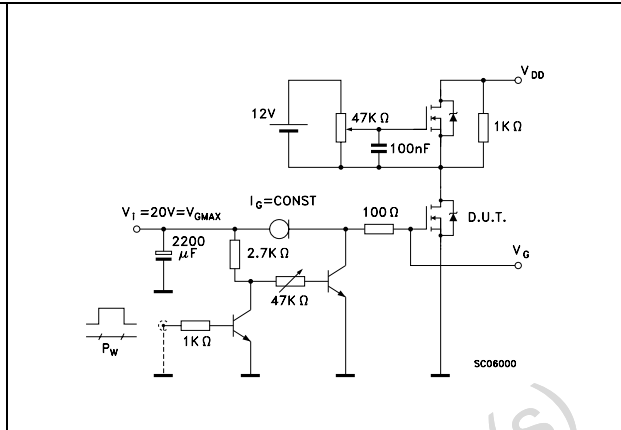


Figure 27. Test circuit for inductive load switching and diode recovery times

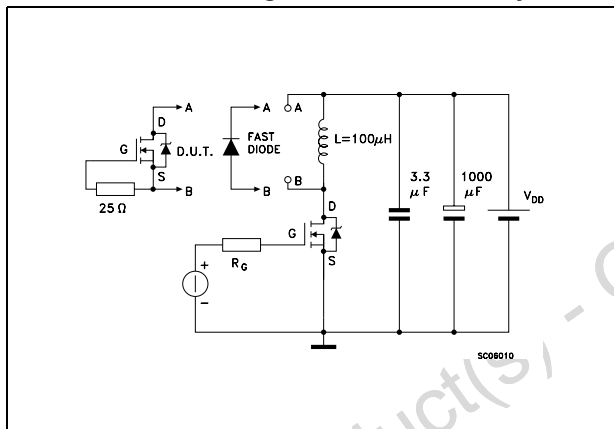


Figure 28. Unclamped Inductive load test circuit

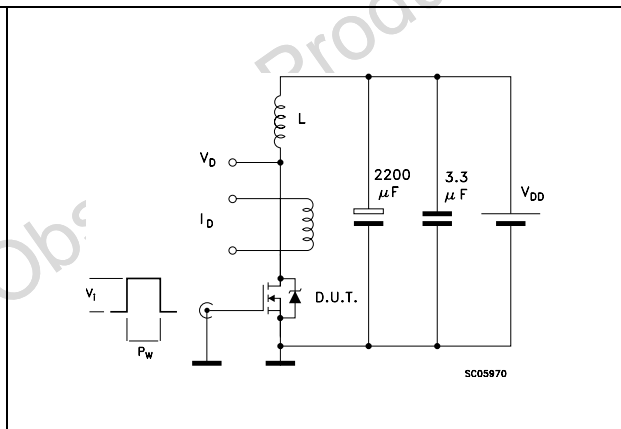


Figure 29. Unclamped inductive waveform

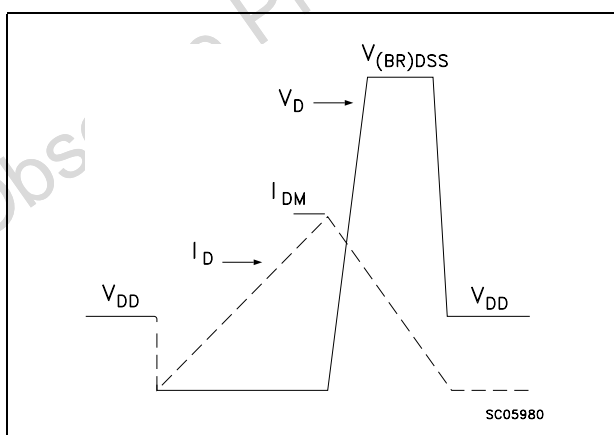
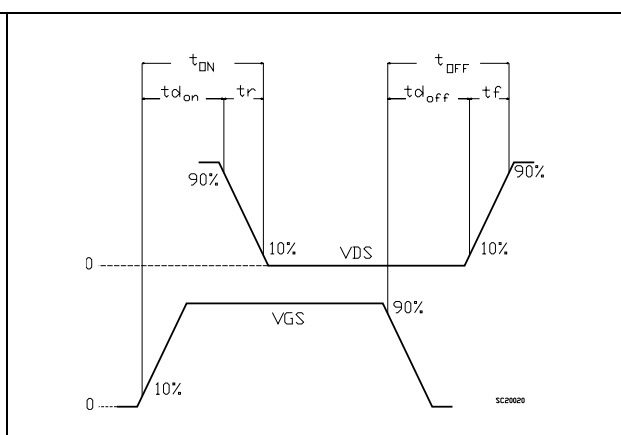


Figure 30. Switching time waveform



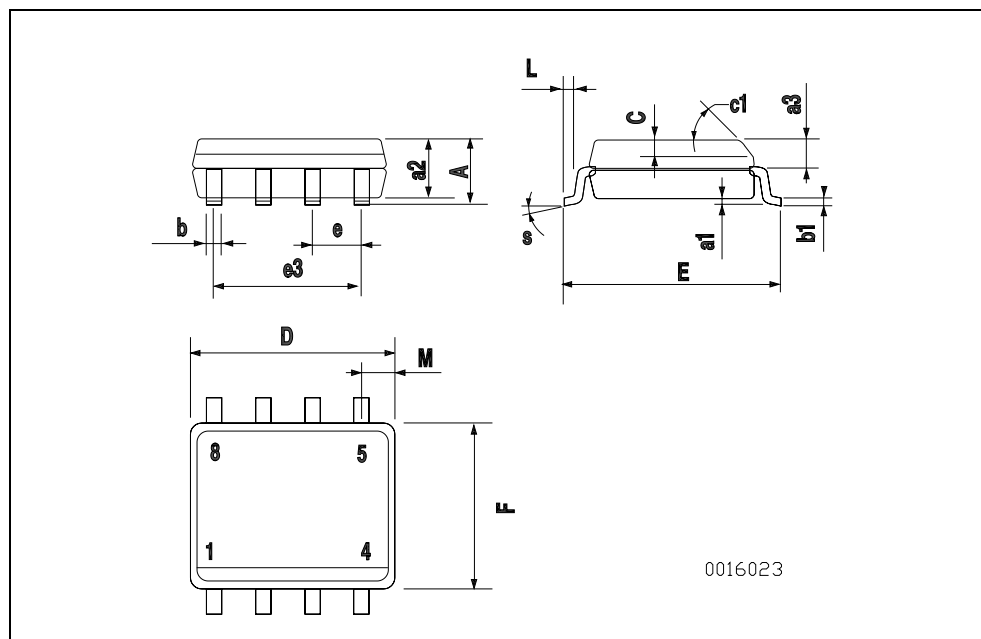
## 4 Package mechanical data

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](http://www.st.com)

Obsolete Product(s) - Obsolete Product(s)

**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.)					



0016023

## 5 Revision history

Table 7. Revision history

Date	Revision	Changes
22-Jun-2004	1	First release
27-May-2005	2	New ECOPACK label
13-Nov-2006	3	The document has been reformatted

Obsolete Product(s) - Obsolete Product(s)

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