



THE DATASHEET OF STS8C5H30L



N-channel 30 V, 0.018 Ω typ., 8 A, P-channel 30 V, 0.045 Ω typ., 5 A Power MOSFET in a SO-8 package

Datasheet - production data

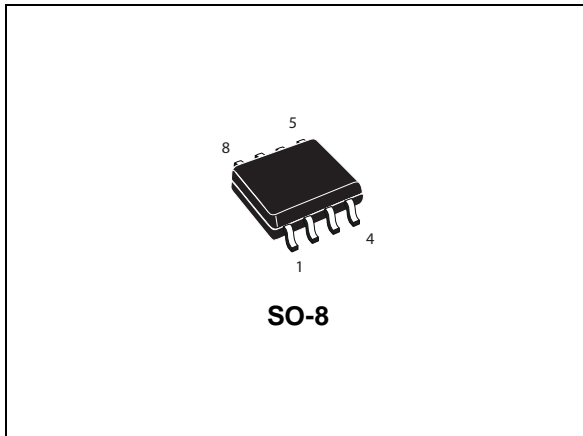
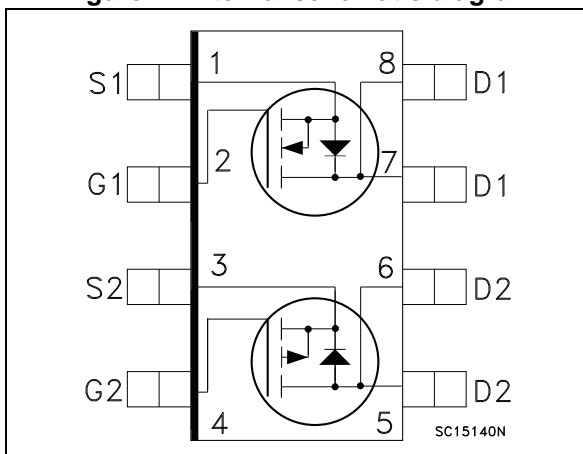


Figure 1. Internal schematic diagram



Features

Order code	Channel	V _{DS}	R _{DS(on)} max	I _D
STS8C5H30L	N	30 V	0.022 Ω	8 A
	P		0.055 Ω	5 A

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

Applications

- Switching applications

Description

This device is a complementary N-channel and P-channel Power MOSFET developed using STripFET™ II (P-channel) and STripFET™ V (N-channel) technologies. The resulting transistors show extremely high packing density for low on-resistance and rugged avalanche characteristics.

Table 1. Device summary

Order code	Marking	Packages	Packaging
STS8C5H30L	8C5H30L	SO-8	Tape and reel

Contents

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		N-channel	P-channel	
V_{DS}	Drain-source voltage	30		V
V_{GS}	Gate- source voltage	±16	±16	V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$ single operating	8	5.4	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$ single operating	6.4	4.3	A
$I_{DM}^{(1)}$	Drain current (pulsed)	32	21.6	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$ dual operating	1.6		W
	Total dissipation at $T_C = 25^\circ\text{C}$ single operating	2		W
T_{stg}	Storage temperature	-55 to 150		$^\circ\text{C}$
T_j	Operating junction temperature	150		$^\circ\text{C}$

1. Pulse width limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-a}^{(1)}$	Thermal resistance junction-ambient single operating	62.5	$^\circ\text{C}/\text{W}$
$R_{thj-a}^{(1)}$	Thermal resistance junction-ambient dual operating	78	$^\circ\text{C}/\text{W}$

1. When mounted on 1 inch² FR-4 board, 2 oz. Cu., $t \leq 10$ sec

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

2 Electrical characteristics

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

Table 4. On/off states

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

Table 5. Dynamic

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

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

For the p-channel MOSFET actual polarity of voltages and current has to be reversed

Table 6. Switching times

Symbol	Parameter	Test conditions	Channel	Min.	Typ.	Max.	Unit	
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}, I_D = 4\text{ A}$ $R_G = 4.7\ \Omega, V_{GS} = 4.5\text{ V}$	N	-	12	-	ns	
			P	-	25	-	ns	
t_r	Rise time		N	-	14.5	-	ns	
			P	-	35	-	ns	
$t_{d(off)}$	Turn-off delay time		$V_{DD} = 15\text{ V}, I_D = 2\text{ A}$ $R_G = 4.7\ \Omega, V_{GS} = 4.5\text{ V}$ <i>Figure 26</i>	N	-	23	-	ns
				P	-	125	-	ns
t_f	Fall time	N		-	8	-	ns	
		P		-	35	-	ns	

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Channel	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		N	-		8	A
			P	-		5	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		N	-		32	A
			P	-		20	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 8\text{ A}, V_{GS} = 0$	N	-		1.5	V
		$I_{SD} = 5\text{ A}, V_{GS} = 0$	P	-		1.2	V
t_{rr}	Reverse recovery time	N-channel $I_{SD} = 8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 15\text{ V}, T_j = 150\text{ }^\circ\text{C}$	N	-	15		ns
			P	-	45		ns
Q_{rr}	Reverse recovery charge	P-channel $I_{SD} = 5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 15\text{ V}, T_j = 150\text{ }^\circ\text{C}$	N	-	5.7		nC
			P	-	36		nC
I_{RRM}	Reverse recovery current	$V_{DD} = 15\text{ V}, T_j = 150\text{ }^\circ\text{C}$ <i>Figure 28</i>	N	-	0.76		A
			P	-	1.6		A

1. Pulse width limited by safe operating area.

2. 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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area n-ch

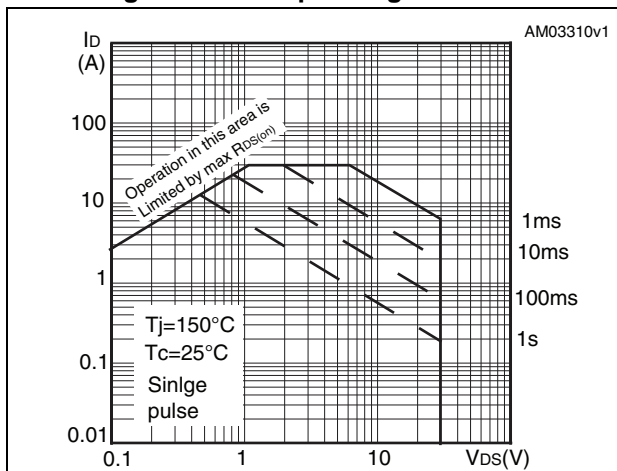


Figure 3. Thermal impedance n-ch

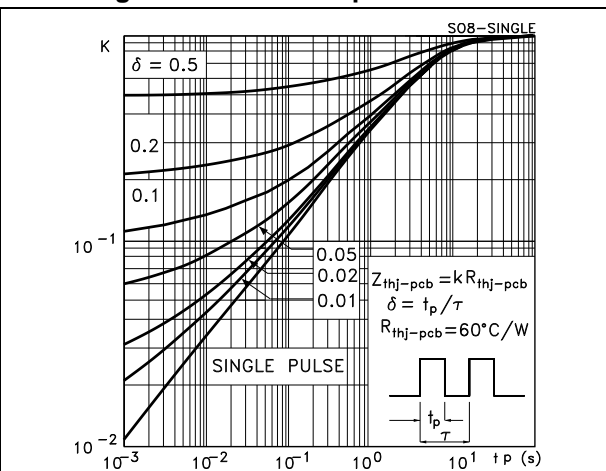


Figure 4. Output characteristics n-ch

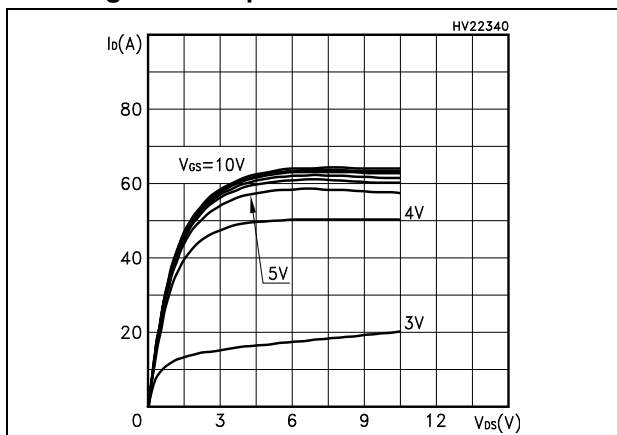


Figure 5. Transfer characteristics n-ch

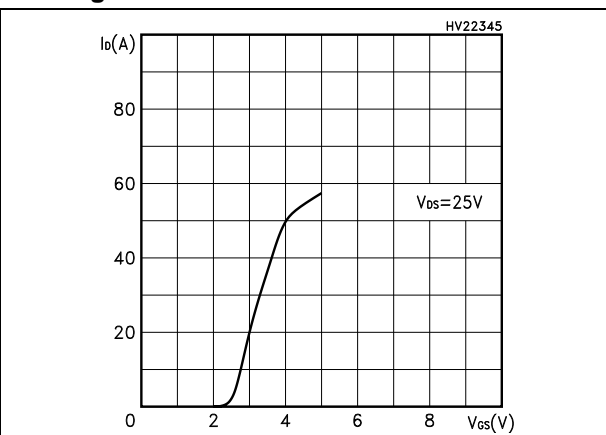


Figure 6. Transconductance n-ch

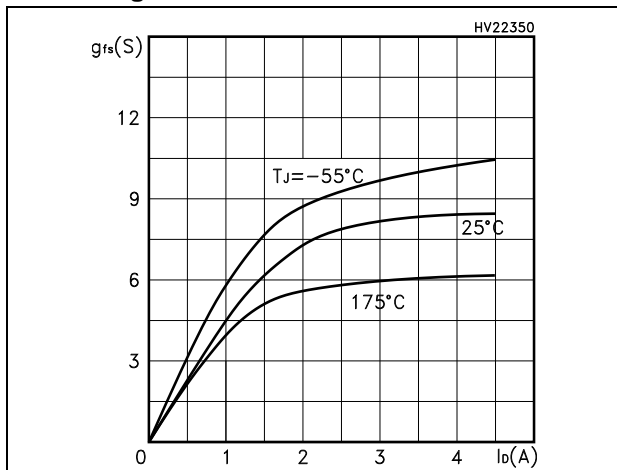


Figure 7. Static drain-source on resistance n-ch

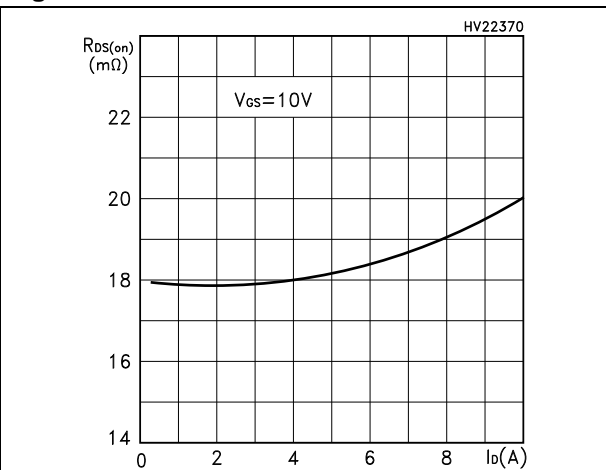


Figure 8. Gate charge vs. gate-source voltage n-ch

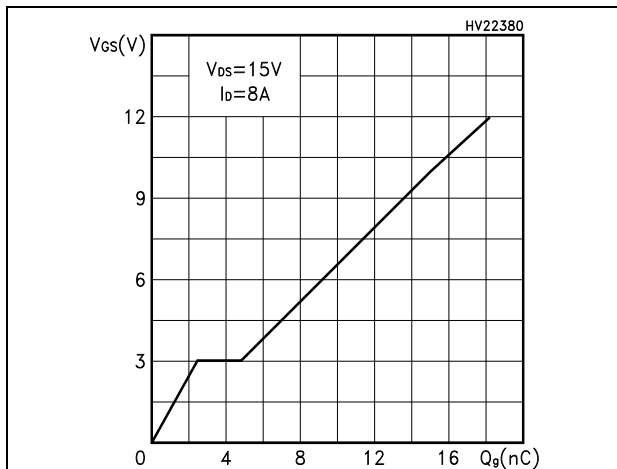


Figure 9. Capacitance variations n-ch

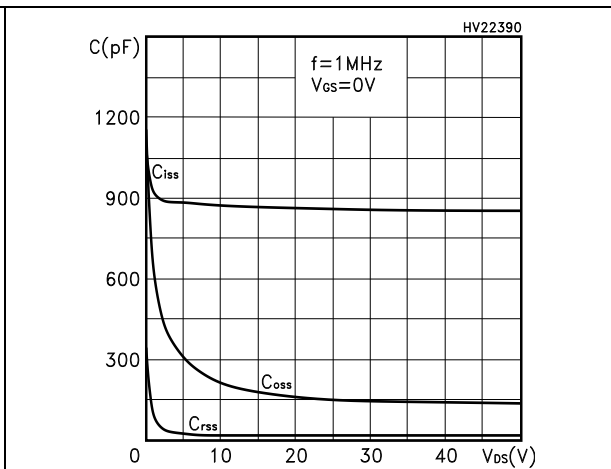


Figure 10. Normalized gate threshold voltage vs. temperature n-ch

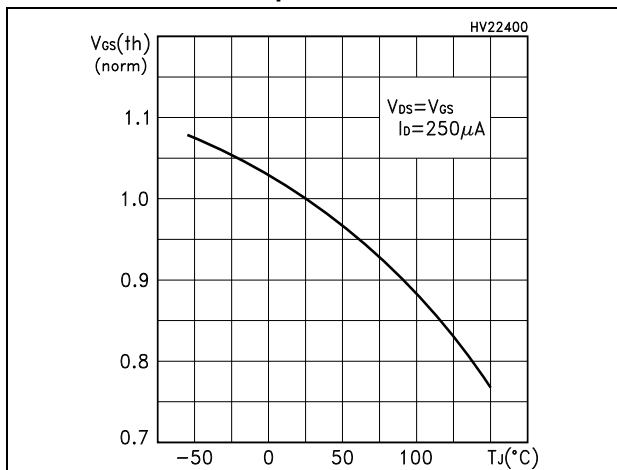


Figure 11. Normalized on resistance vs. temperature n-ch

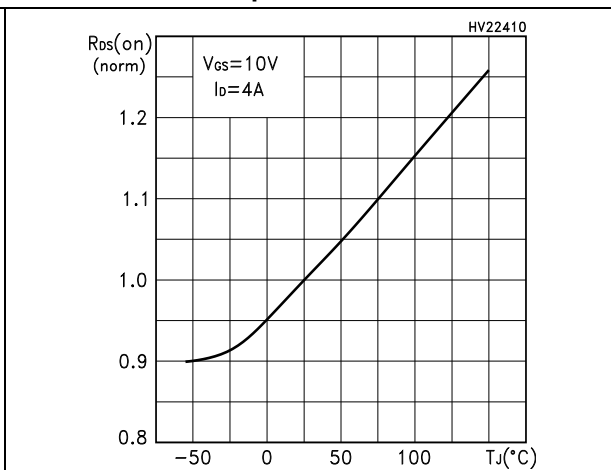


Figure 12. Source-drain diode forward characteristics n-ch

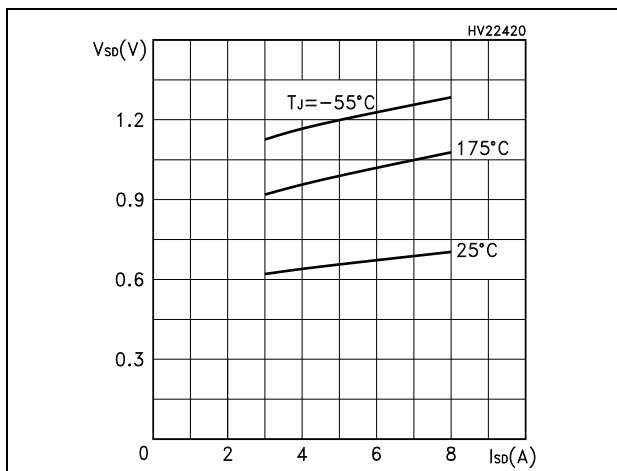


Figure 13. Normalized breakdown voltage vs. temperature n-ch

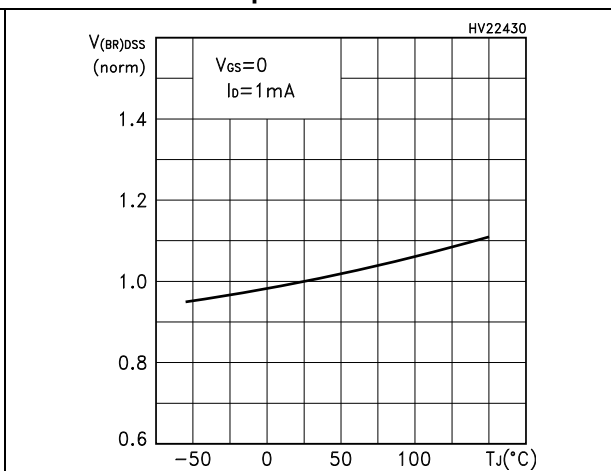


Figure 14. Safe operating area p-ch

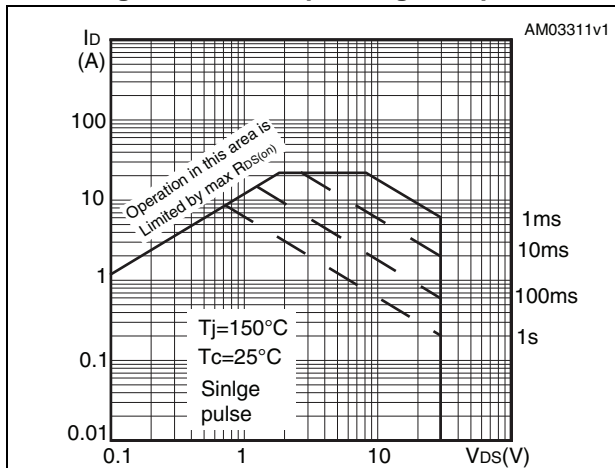


Figure 15. Thermal impedance p-ch

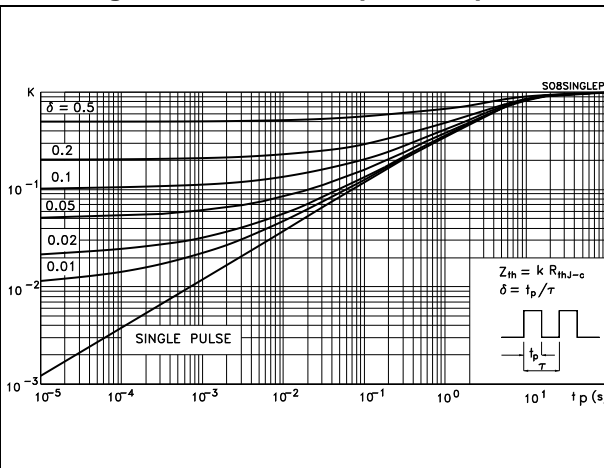


Figure 16. Output characteristics p-ch

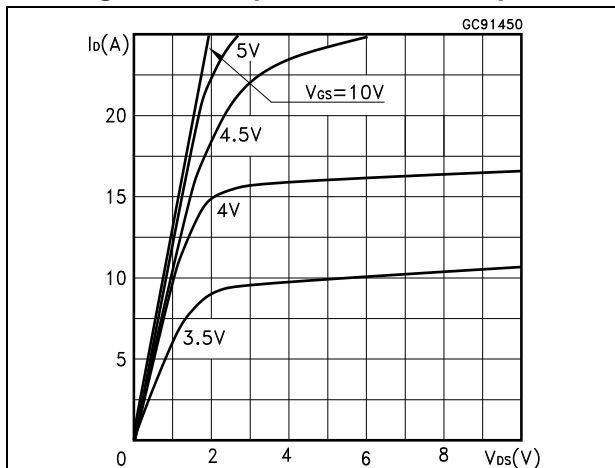


Figure 17. Transfer characteristics p-ch

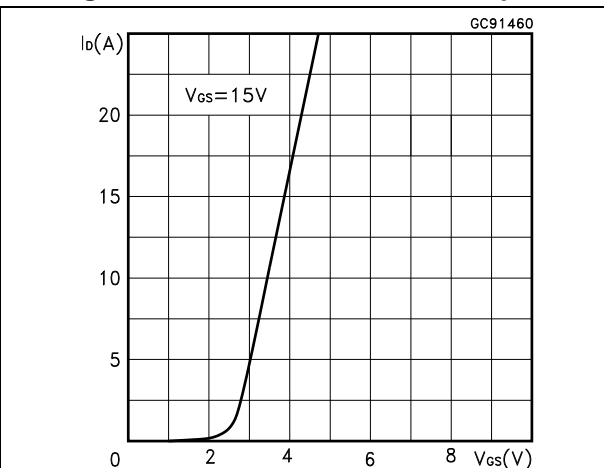


Figure 18. Transconductance p-ch

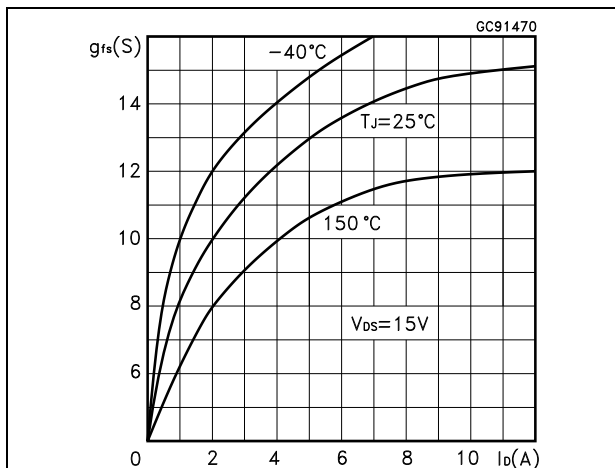


Figure 19. Static drain-source on resistance p-ch

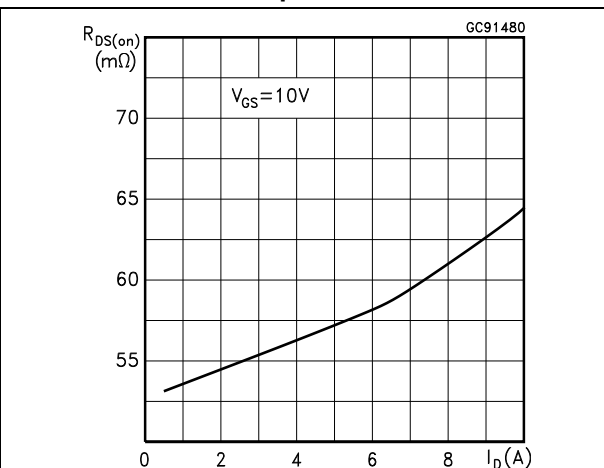


Figure 20. Gate charge vs. gate-source voltage p-ch

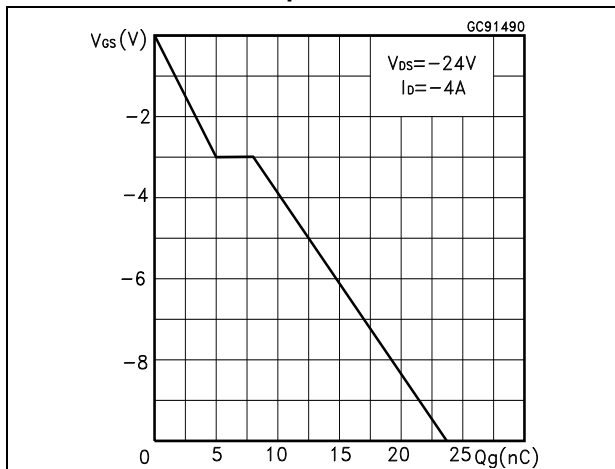


Figure 21. Capacitance variations p-ch

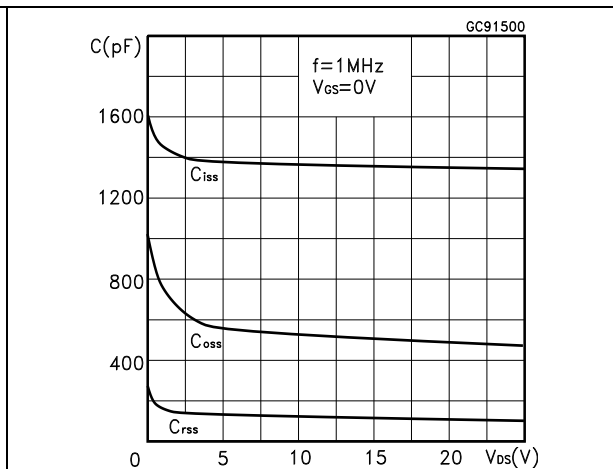


Figure 22. Normalized gate threshold voltage vs. temperature p-ch

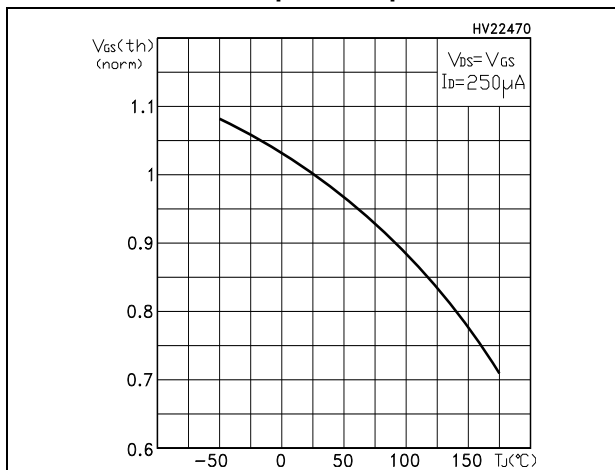


Figure 23. Normalized on resistance vs. temperature p-ch

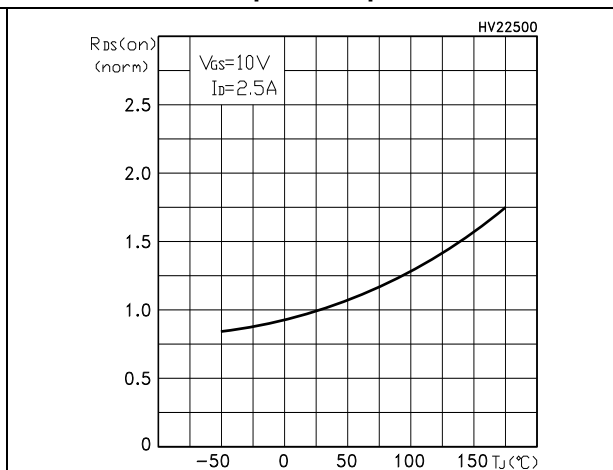


Figure 24. Source-drain diode forward characteristics p-ch

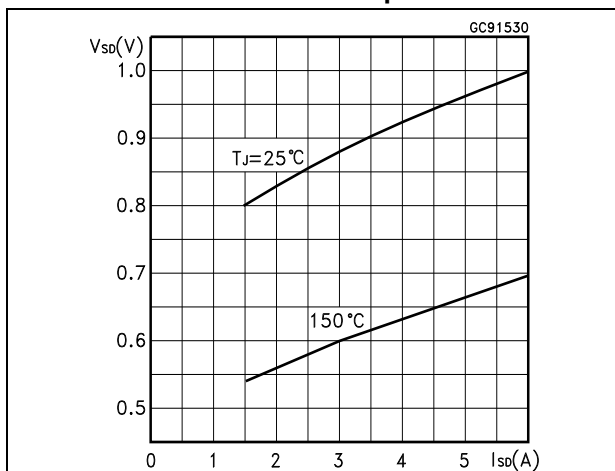
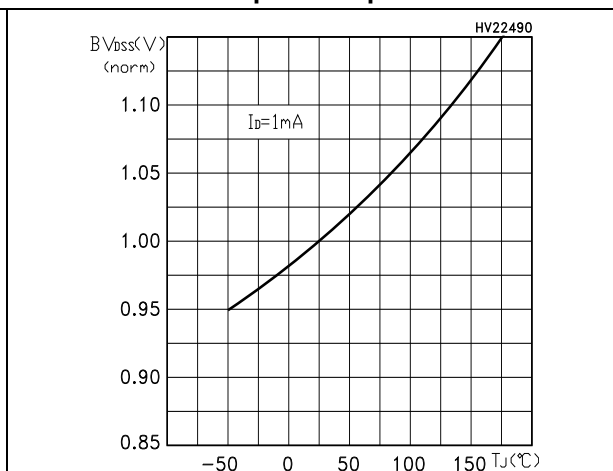
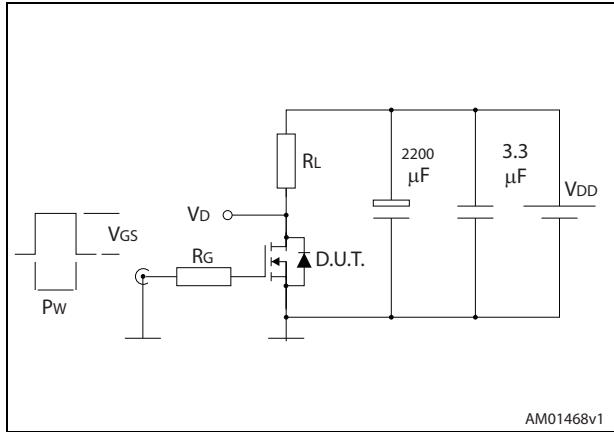


Figure 25. Normalized breakdown voltage vs. temperature p-ch



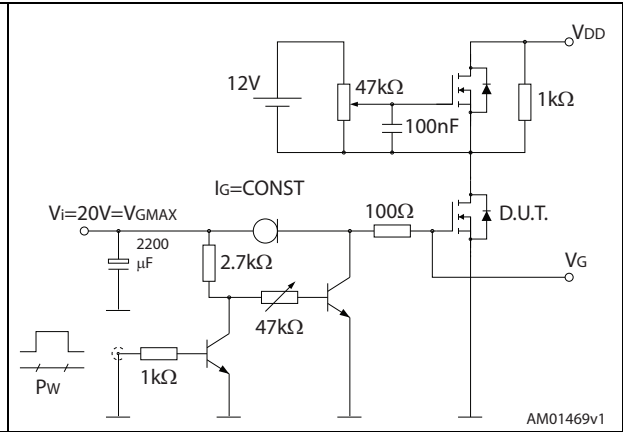
3 Test circuits

Figure 26. Switching times test circuit for resistive load



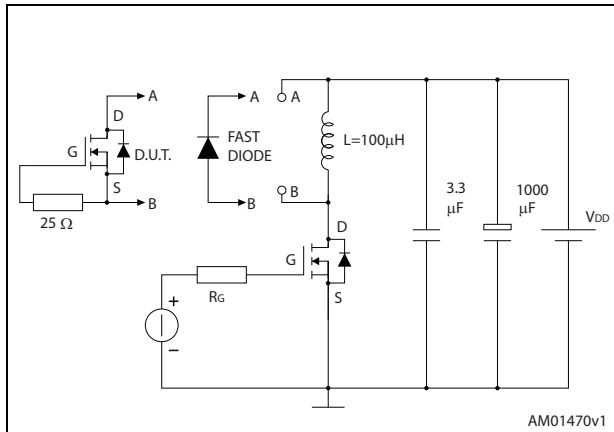
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Figure 27. Gate charge test circuit



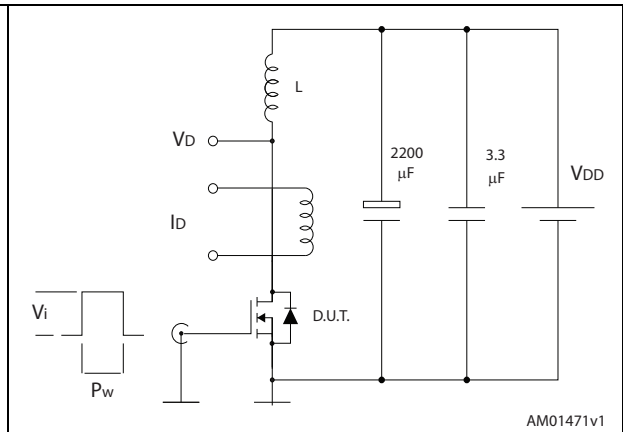
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Figure 28. Test circuit for inductive load switching and diode recovery times



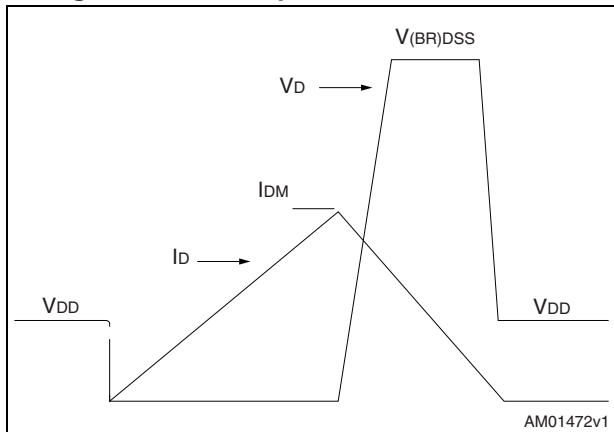
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Figure 29. Unclamped inductive load test circuit



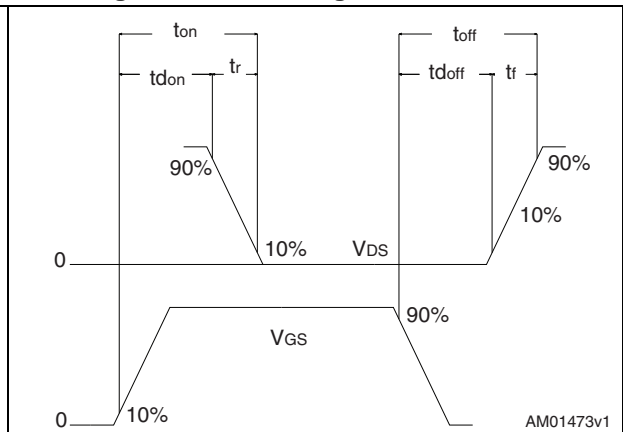
AM01471v1

Figure 30. Unclamped inductive waveform



AM01472v1

Figure 31. Switching time waveform



AM01473v1

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Figure 32. SO-8 drawing

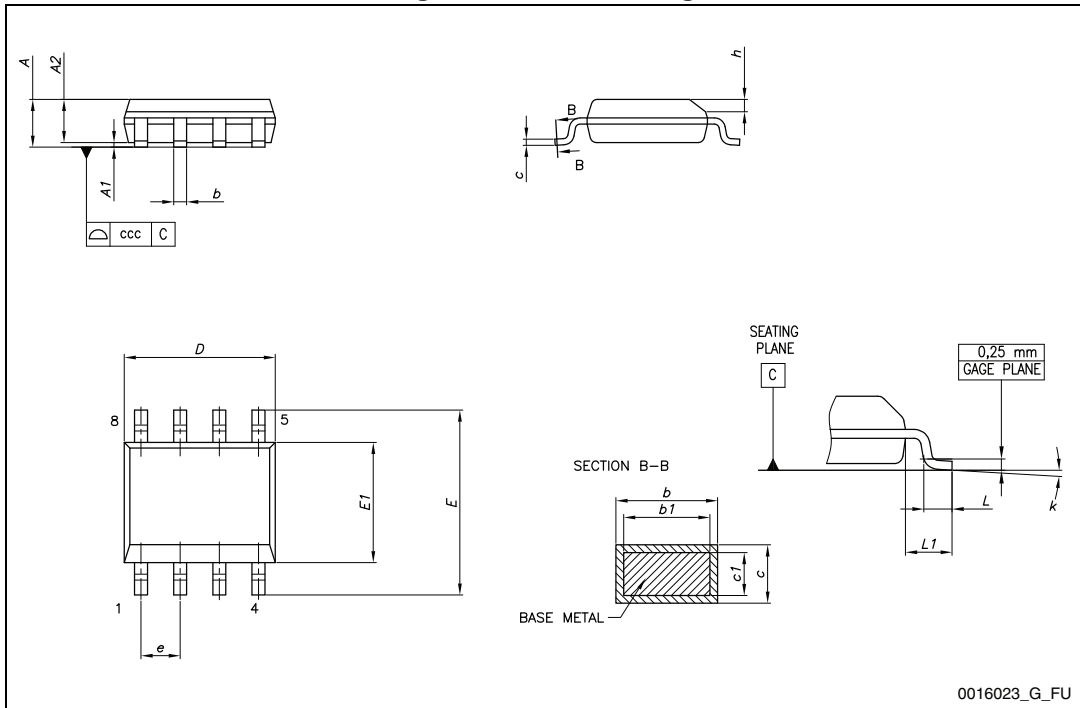
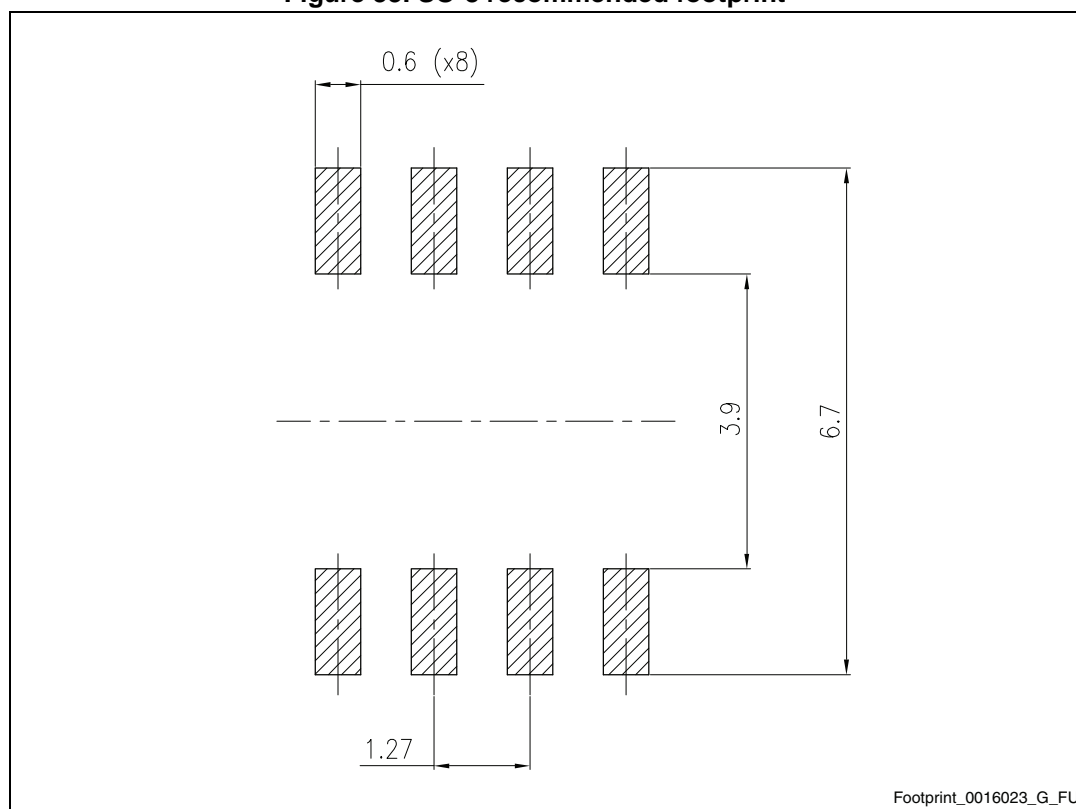


Table 8. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.31		0.51
b1	0.28		0.48
c	0.10		0.25
c1	0.10		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
L2		0.25	
k	0°		8°
ccc			0.10

Figure 33. SO-8 recommended footprint^(a)



a. All dimensions are in millimeters.

5 Packaging mechanical data

Figure 34. SO-8 tape and reel dimensions

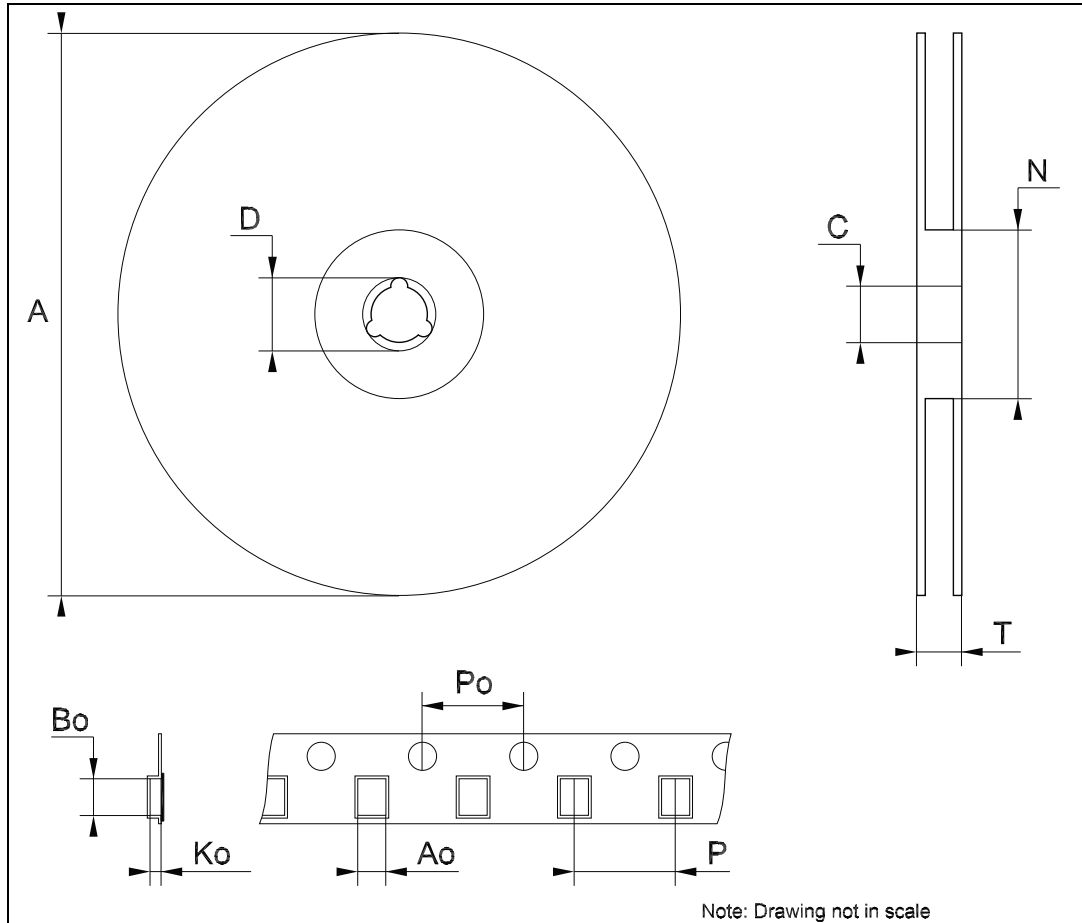


Table 9. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A		-	330
C	12.8	-	13.2
D	20.2	-	
N	60	-	
T		-	22.4
Ao	8.1	-	8.5
Bo	5.5	-	5.9
Ko	2.1	-	2.3
Po	3.9	-	4.1
P	7.9	-	8.1

6 Revision history

Table 10. 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.
23-Feb-2009	5	Figure 2 , Figure 3 , Figure 14 and Figure 15 have been changed.
10-Jun-2010	6	Updated $V_{GS(th)}$ in Table 4: On/off states .
13-Jun-2014	7	<ul style="list-style-type: none">– Modified: title– Modified: Description– Modified: marking in Table 1– Updated: Section 4: Package mechanical data– Minor text changes

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