STS9P3LLH6

P-channel -30 V, 12 mΩ typ., -9 A, STripFET™ H6 Power MOSFET in an SO-8 package

Datasheet - production data

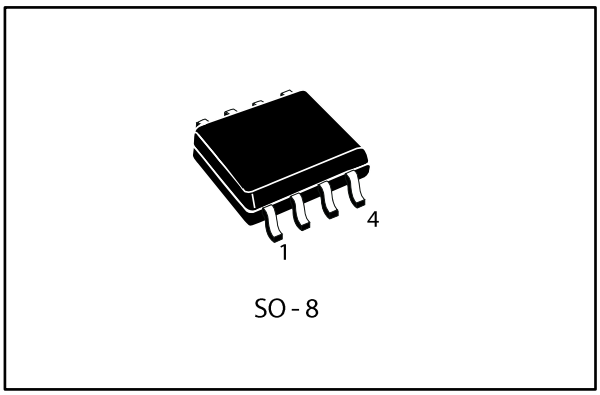
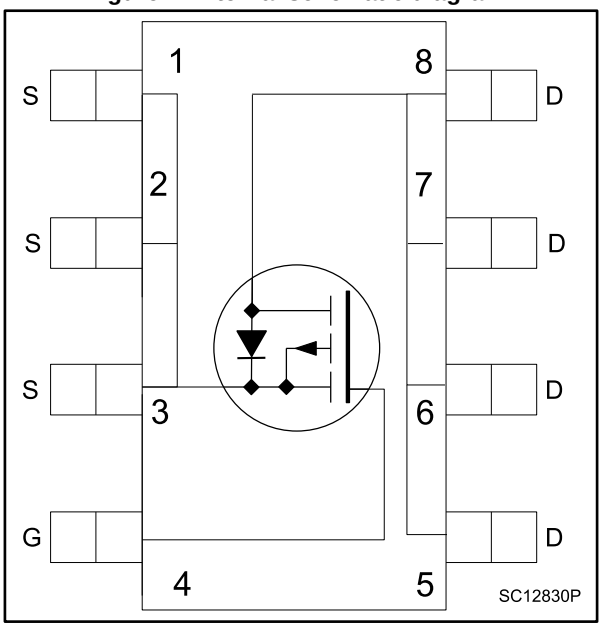


Figure 1: Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D
STS9P3LLH6	-30 V	15 mΩ	-9 A

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

Applications

- Switching applications

Description

This device is a P-channel Power MOSFET developed using the STripFET™ H6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low $R_{DS(on)}$ in all packages.

Table 1: Device summary

Order code	Marking	Packages	Packing
STS9P3LLH6	9K3L	SO-8	Tape and reel

This is information on a product in full production.

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1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	-30	V
V_{GS}	Gate- source voltage	±20	V
I_D (1)	Drain current (continuous) at T_{amb} = 25°C	-9	A
	Drain current (continuous) at T_{amb} = 100°C	-5.6	
I_{DM} (2)	Drain current (pulsed)	-36	A
P_{TOT} (1)	Total dissipation at T_{amb} = 25°C	2.7	W
T_{stg}	Storage temperature range	-55 to 150	°C
T_j	Operating junction temperature range		

Notes:

(1)This value is rated according to $R_{thj\text{-}amb}$

(2)Pulse width limited by safe operating area

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}amb}$ (1)	Thermal resistance junction-amb	47	°C/W

Notes:

(1)When mounted on 1 inch² FR-4 board, 2 oz. Cu., t ≤ 10 s

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 = -1 mA	-30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = -30 V			-1	µA
		V_{DS} = -30 V, T_C = 125 °C (1)			-10	µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			-100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = -250 µA	-1		-2	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = -10 V, I_D = -4.5 A		12	15	mΩ
		V_{GS} = -4.5 V, I_D = -4.5 A		18	22.5	mΩ

Notes:

(1)Defined by design, not subject to production test.

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = -25 V, f = 1 MHz, V_{GS} = 0 V	-	2615	-	pF
C_{oss}	Output capacitance		-	340	-	pF
C_{rss}	Reverse transfer capacitance		-	235	-	pF
Q_g	Total gate charge	V_{DD} = -15 V I_D = -9 A V_{GS} = -4.5 V	-	24	-	nC
Q_{gs}	Gate-source charge		-	9	-	nC
Q_{gd}	Gate-drain charge		-	8	-	nC

Table 6: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = -15 V, I_D = -4.5 A R_G = 4.7 Ω, V_{GS} = -10 V	-	13.2	-	ns
t_r	Rise time		-	93	-	ns
$t_{d(off)}$	Turn-off delay time		-	50	-	ns
t_f	Fall time		-	18	-	ns

Table 7: Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD} (1)	Forward on voltage	I_{SD} = -4.5 A, V_{GS} = 0	-		-1.1	V
t_{rr}	Reverse recovery time	I_{SD} = -4.5 A, di/dt = 100 A/µs V_{DD} = -24 V, T_j = 150 °C	-	20		ns
Q_{rr}	Reverse recovery charge		-	16		nC
I_{RRM}	Reverse recovery current		-	-1.6		A

Notes:

(1)Pulsed: Pulse duration = 300 µs, duty cycle 1.5%

2.2 Electrical characteristics (curves)

Note: For the P-channel Power MOSFET, current and voltage polarities are reversed.

Figure 2: Safe operating area

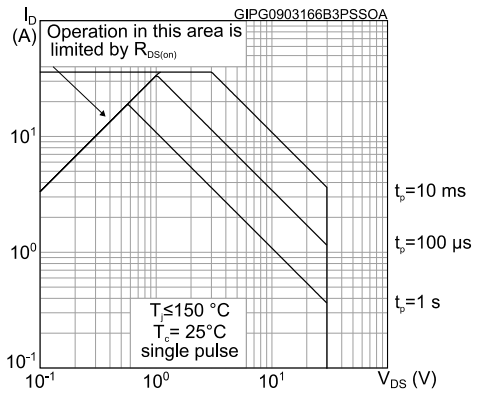


Figure 3: Thermal impedance

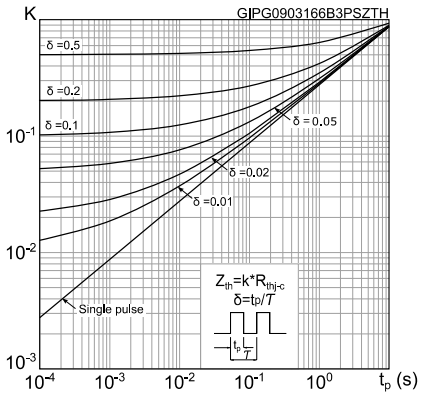


Figure 4: Output characteristics

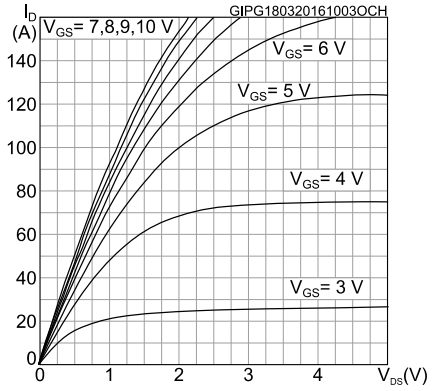


Figure 5: Transfer characteristics

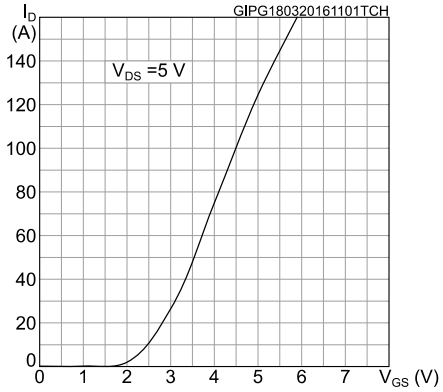


Figure 6: Gate charge vs gate-source voltage

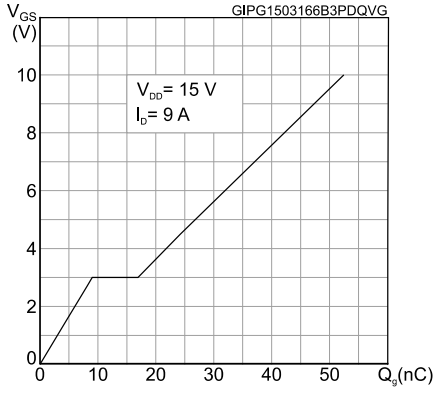


Figure 7: Static drain-source on-resistance

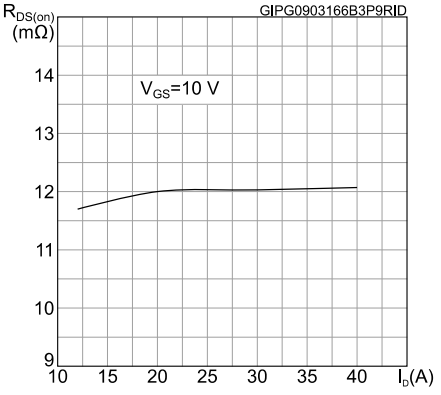


Figure 8: Capacitance variations

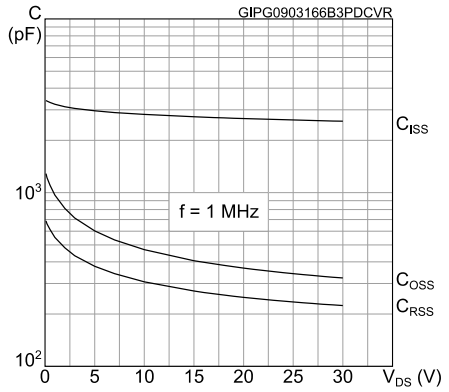


Figure 9: Normalized gate threshold voltage vs temperature

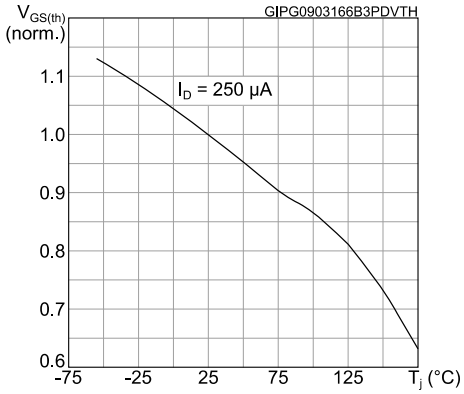


Figure 10: Normalized on-resistance vs temperature

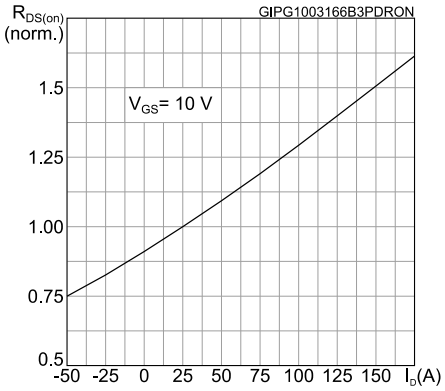


Figure 11: Normalized $V_{(BR)DSS}$ vs temperature

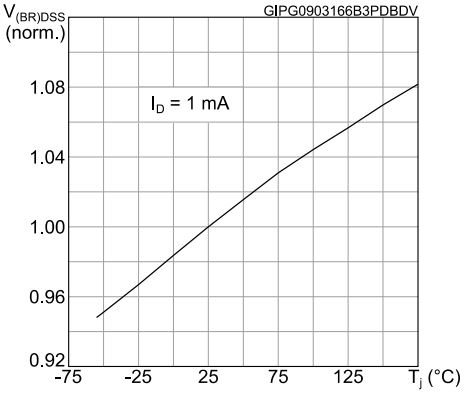
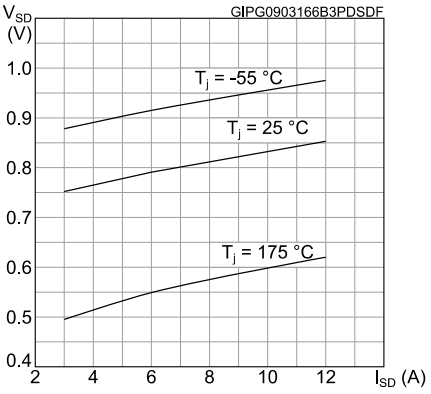


Figure 12: Source-drain diode forward characteristics



3 Test circuits

Figure 13: Switching times test circuit for resistive load

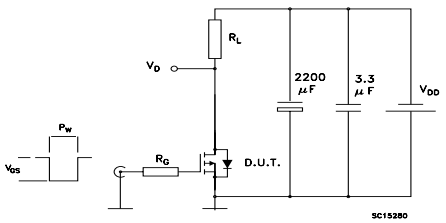


Figure 14: Gate charge test circuit

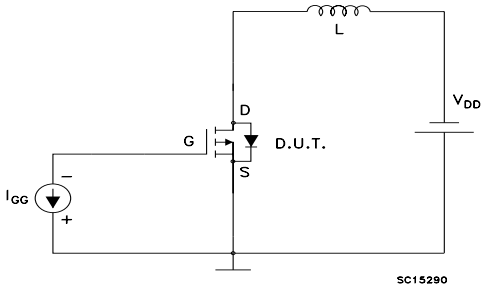
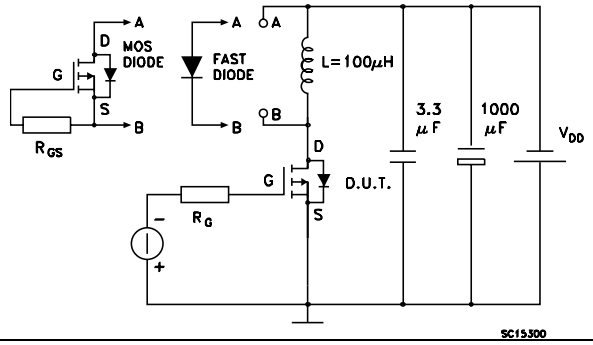


Figure 15: Test circuit for inductive load switching and diode recovery times



4 Package information

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.

4.1 SO-8 package information

Figure 16: SO-8 package outline

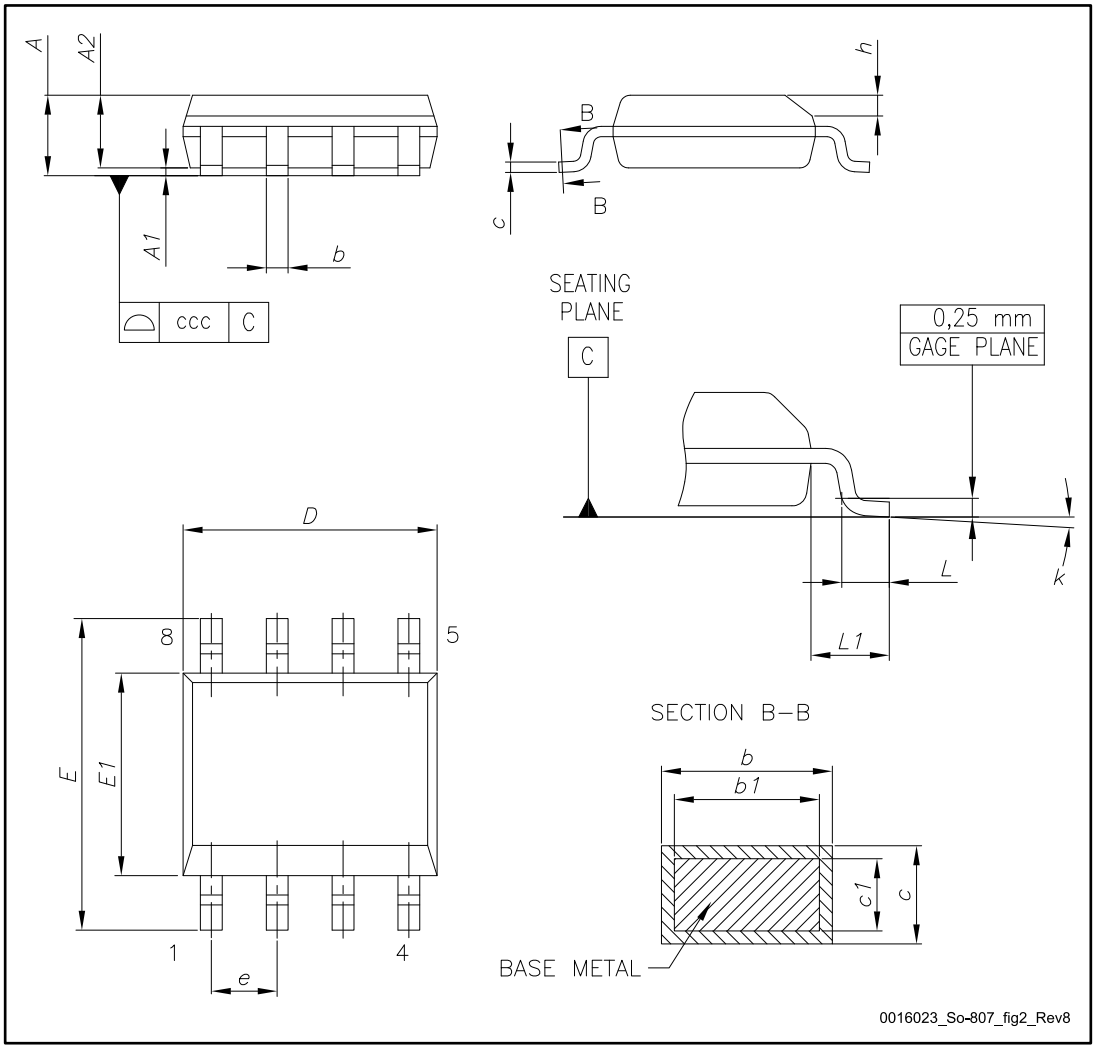
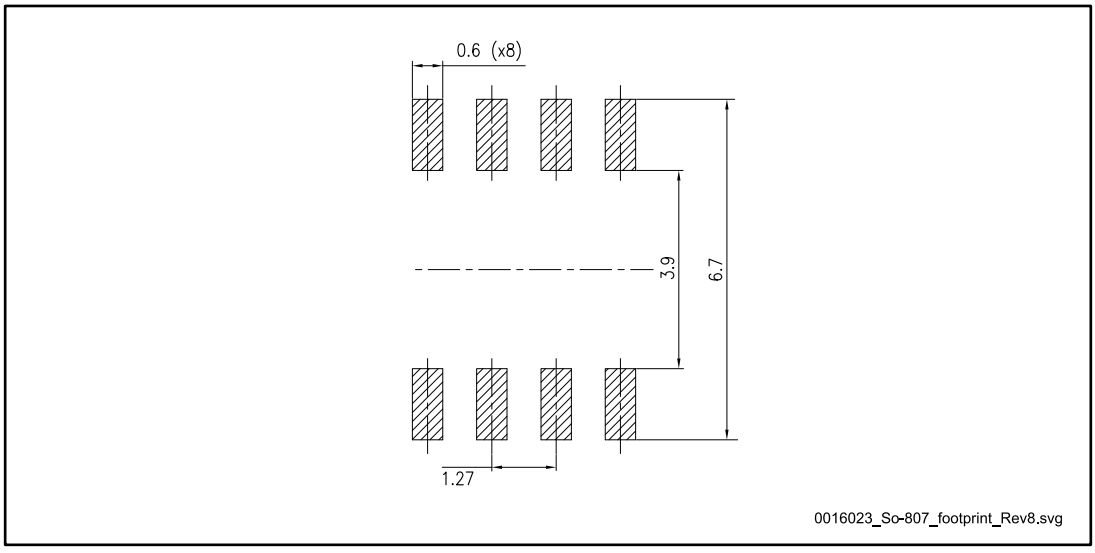


Table 8: SO-8 mechanical data

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 17: SO-8 recommended footprint (dimensions are in mm)



4.2 SO-8 packing information

Figure 18: SO-8 tape and reel dimensions

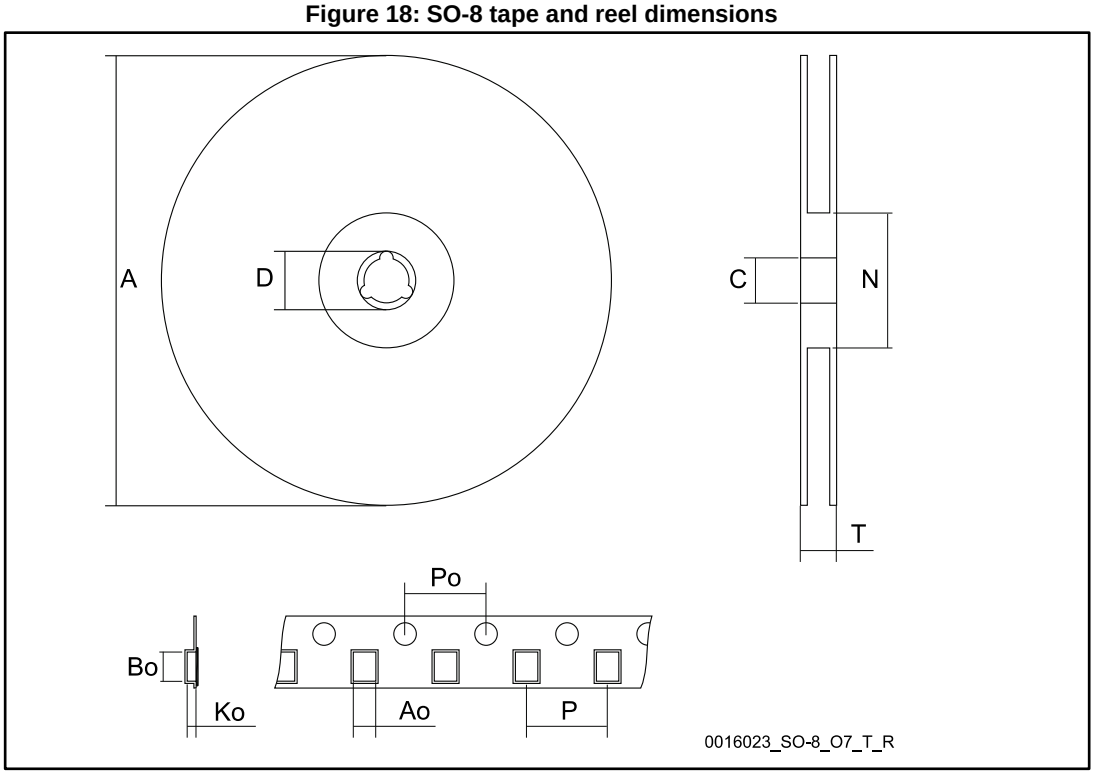


Table 9: SO-8 tape and reel mechanical data

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

5 Revision history

Table 10: Document revision history

Date	Revision	Changes
22-Jan-2014	1	Initial release.
15-Mar-2016	2	Modified: title and $R_{DS(on)}$ max value in cover page Modified: *Table 4: "On/off states"*, *Table 5: "Dynamic"*, *Table 6: "Switching times"* and *Table 7: "Source drain diode"* Minor text changes.

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