STD36P4LLF6

P-channel 40 V, 0.016 Ω typ., 36 A, STripFET™ VI DeepGATE™ Power MOSFET in a DPAK package

Datasheet - target specification

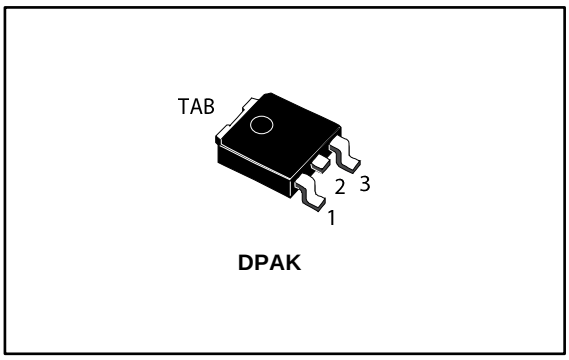
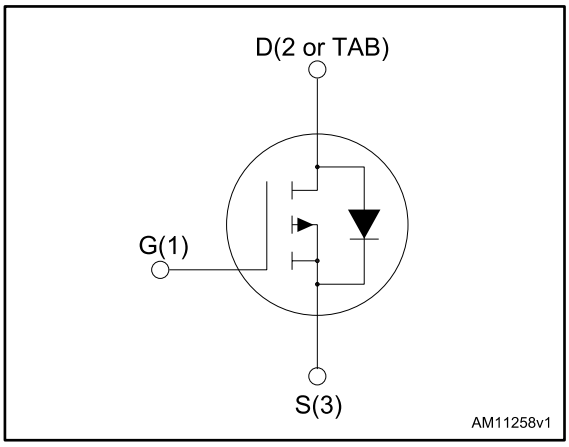


Figure 1: Internal schematic diagram



Features

Order code	V_{DSS}	$R_{DS(on)}$max	I_D	P_{TOT}
STD36P4LLF6	40 V	0.022 Ω	36 A	60 W

- $R_{DS(on)}$* Q_g industry benchmark
- Extremely low on-resistance $R_{DS(on)}$
- High avalanche ruggedness
- Low gate input resistance

Applications

- Switching applications
- LCC converters, resonant converters

Description

This device is a P-channel Power MOSFET developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest $R_{DS(on)}$ in all packages

Table 1: Device summary

Order code	Marking	Package	Packaging
STD36P4LLF6	36P4LLF6	DPAK	Tape and reel

For the P-channel Power MOSFETs the actual polarity of the voltages and the current must be reversed.

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltag	40	V
V_{GS}	Gate-source voltage	±20	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	36	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	26	A
I_{DM} (1)(2)	Drain current (pulsed)	144	A
P_{TOT} (1)	Total dissipation at T_C = 25 °C	60	W
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Max. operating junction temperature	175	°C

Notes:

(1)Limited by wire bonding.

(2)Pulse width limited by safe operating area.

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case max	2.5	°C/W

For the P-channel Power MOSFETs the actual polarity of the voltages and the current must be reversed.

2 Electrical characteristics

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

Table 4: Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown Voltage	I_D = 250 µA, V_{GS} = 0	40			V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 40 V, (V_{GS} = 0) V_{DS} = 40 V, Tc = 125 °C			1 10	µA
I_{GSS}	Gate body leakage current	V_{GS} = ± 20 V, (V_{DS} = 0)			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	1		2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 18 A		0.016	0.022	Ω
		V_{GS} = 4.5 V, I_D = 18A		0.025	0.035	Ω

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 32 V, f = 1 MHz, V_{GS} = 0	-	2300	-	pF
C_{oss}	Output capacitance		-	325	-	pF
C_{rss}	Reverse transfer capacitance		-	120	-	pF
Q_g	Total gate charge	V_{DD} = 24 V, I_D = 36 A V_{GS} = 4.5 V	-	22	-	nC
Q_{gs}	Gate-source charge		-	TBD	-	nC
Q_{gd}	Gate-drain charge		-	TBD	-	nC
R_G	Gate input resistance	f = 1 MHz gate bias Bias = 0 test signal level = 20 mV open drain	-	TBD	-	Ω

For the P-channel Power MOSFETs the actual polarity of the voltages and the current must be reversed.

Table 6: Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 32 V, I_D = 18 A, R_G = 4.7 Ω, V_{GS} = 10 V	-	TBD	-	ns
t_r	Rise time		-	TBD	-	ns
$t_{d(off)}$	Turn-off delay time		-	TBD	-	ns
t_f	Fall time		-	TBD	-	ns

Table 7: Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		36	A
I_{SDM} (1)	Source-drain current (pulsed)		-		144	A
V_{SD}	Forward on voltage	I_{SD} = 18 A, V_{GS} = 0	-		1.1	V
t_{rr}	Reverse recovery time	I_{SD} = 18 A, di/dt = 100 A/µs, V_{DD} = 16 V	-	TBD		ns
Q_{rr}	Reverse recovery charge		-	TBD		nC
I_{RRM}	Reverse recovery current		-	TBD		A

Notes:

(1)Pulse width limited by safe operating area

For the P-channel Power MOSFETs the actual polarity of the voltages and the current must be reversed.

3 Test circuits

Figure 2: Switching times test circuit for resistive load

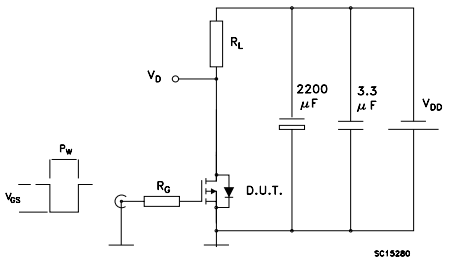


Figure 3: Gate charge test circuit

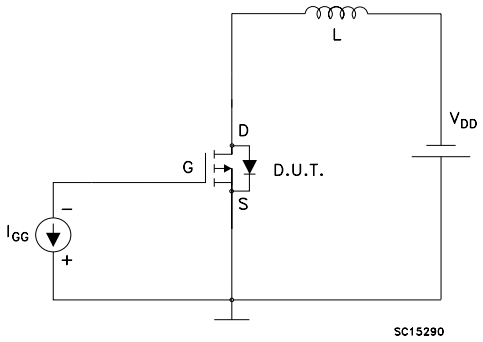
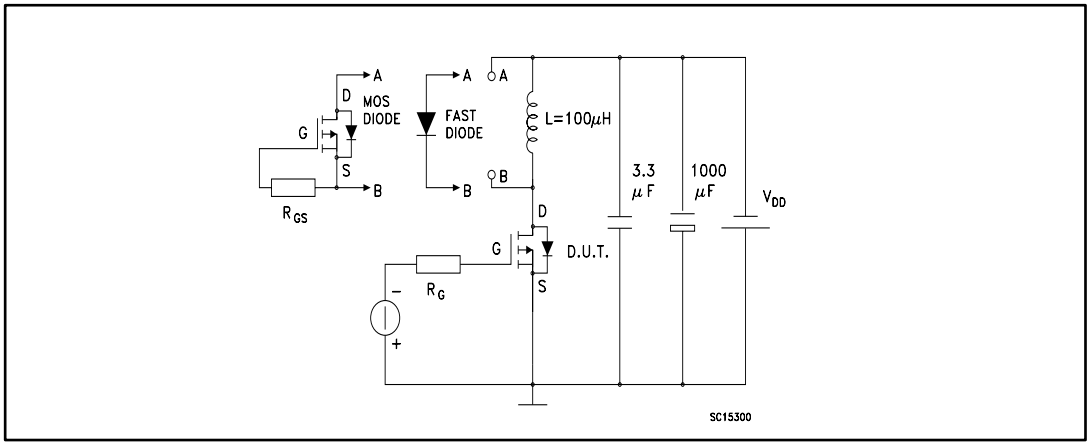


Figure 4: Source-drain diode forward characteristics



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.

4.1 DPAK (TO-252) package mechanical data

Figure 5: DPAK (TO-252) drawing

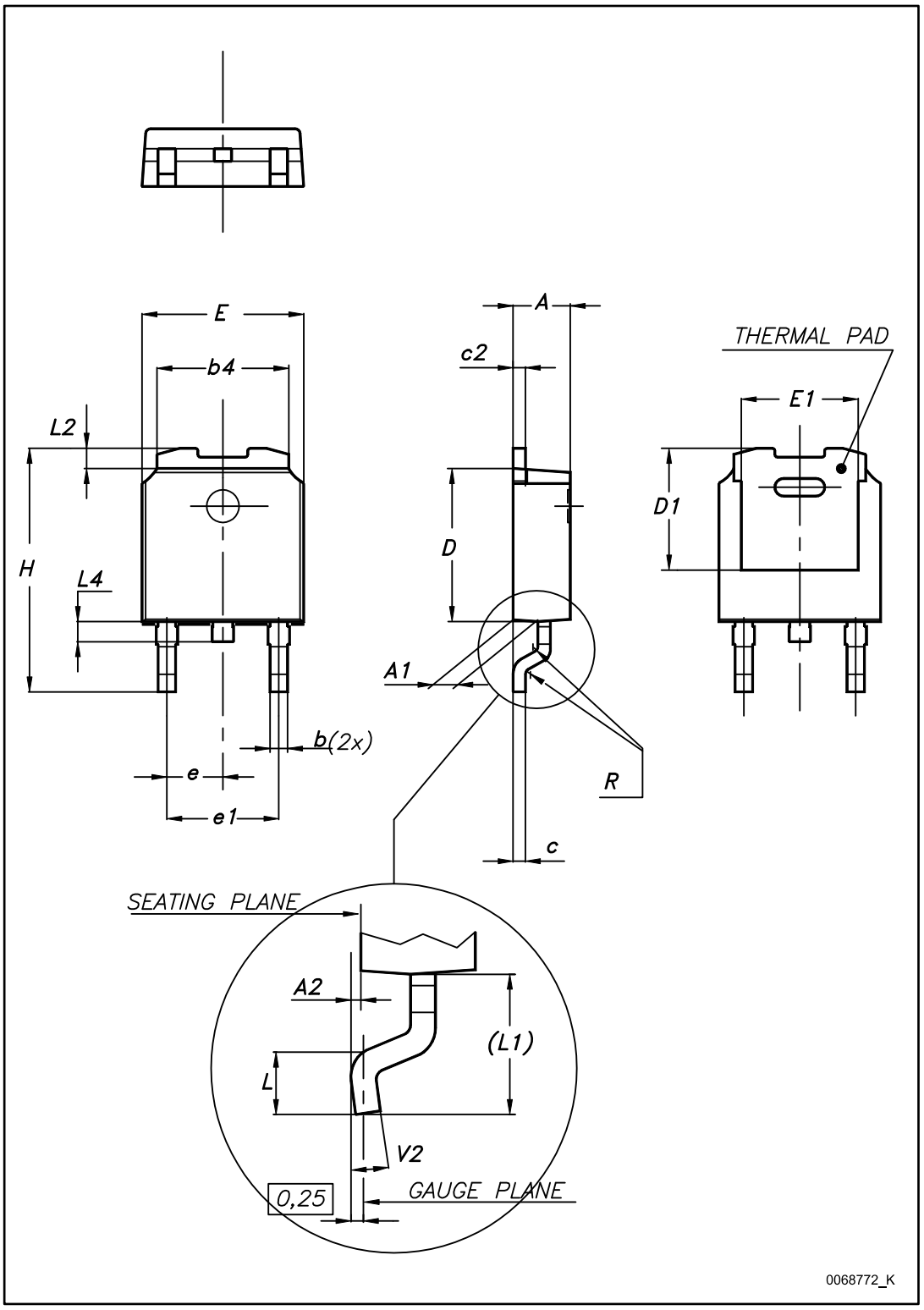
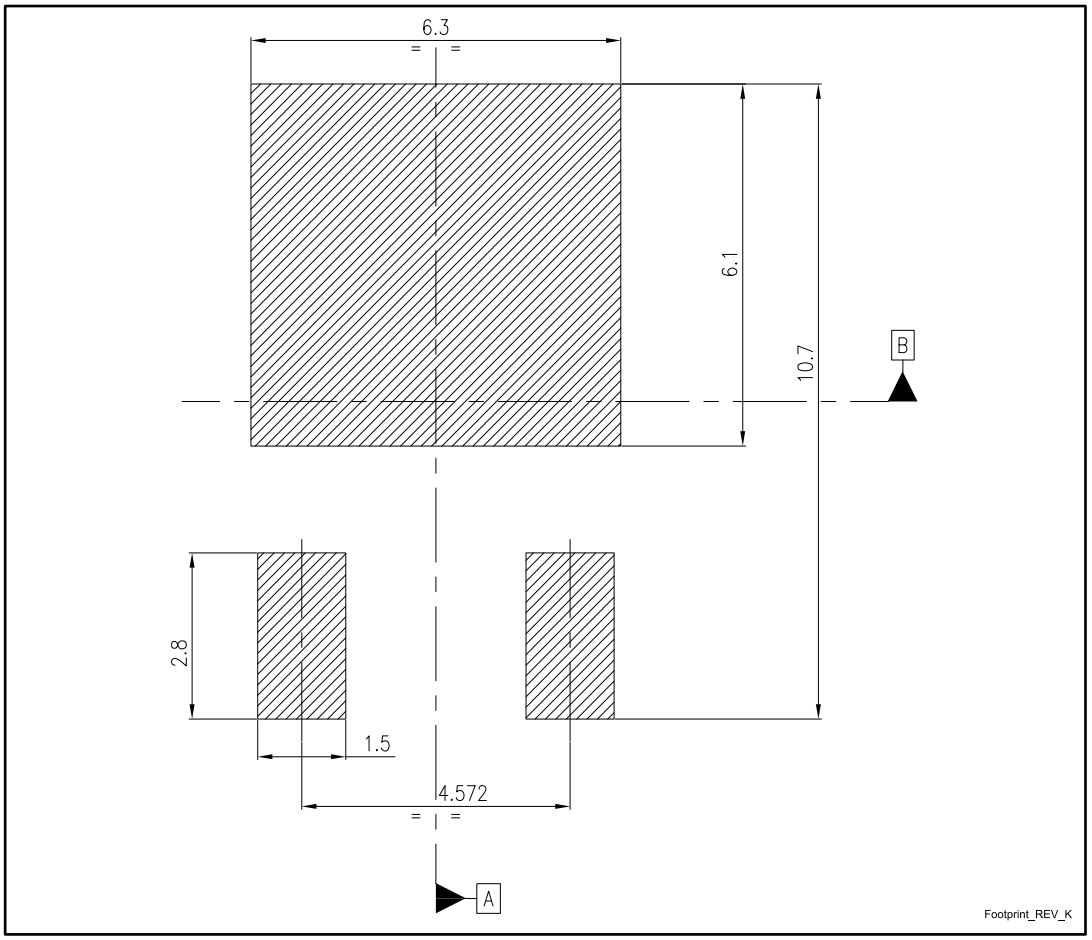


Table 8: DPAK (TO-252) mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1.00		1.50
(L1)		2.80	
L2		0.80	
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 6: DPAK (TO-252) footprint (all dimensions are in millimeters)



5 Packaging mechanical data

5.1 DPAK (TO-252) tape and reel mechanical data

Figure 7: Tape for DPAK (TO-252)

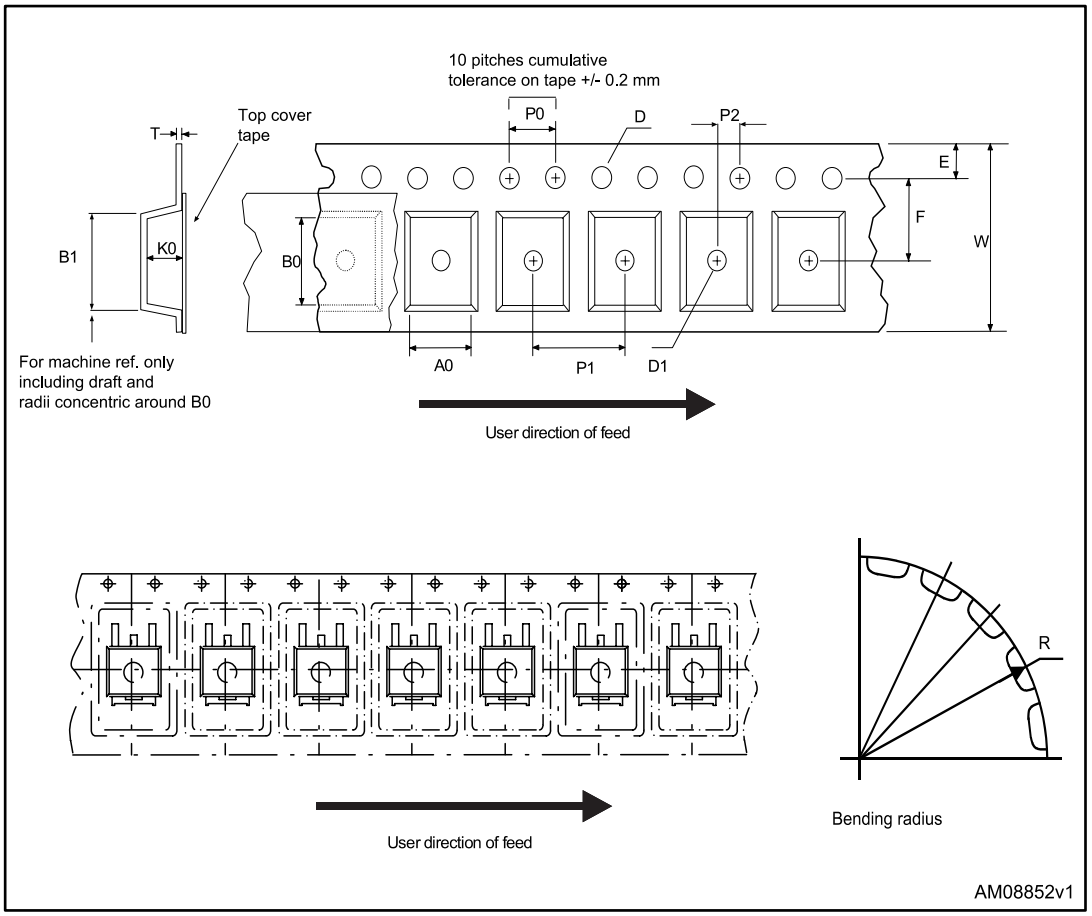


Figure 8: Reel for DPAK (TO-252)

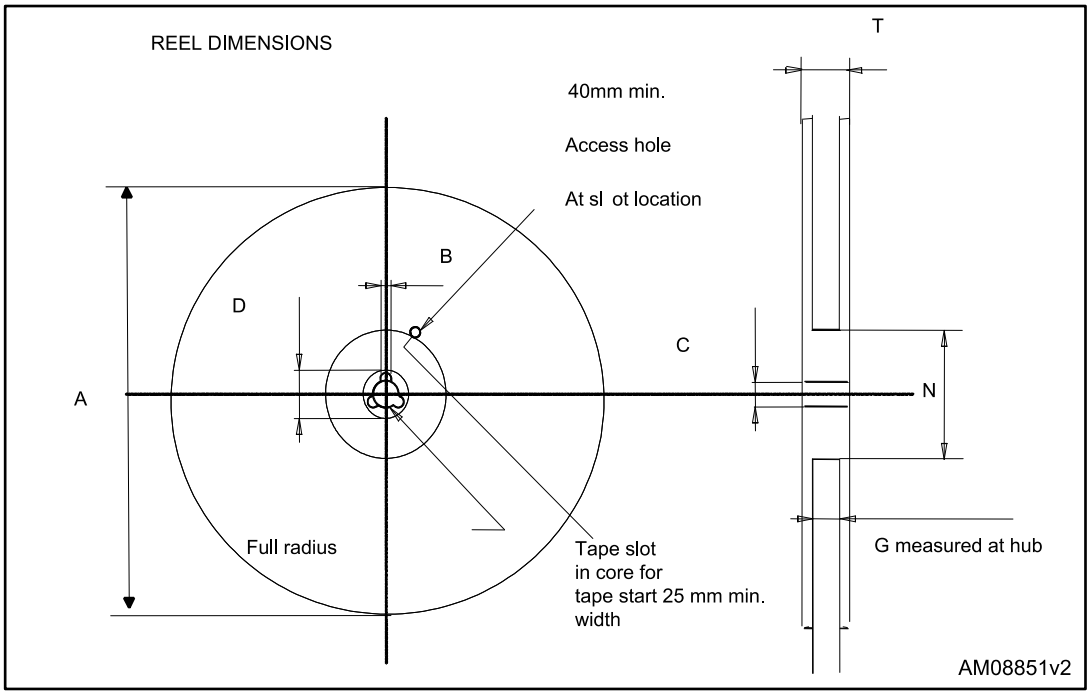


Table 9: DPAK (TO-252) tape and reel mechanical data

Tape			Reel		
Dim.	**mm**		**Dim.**	**mm**	
	Min.	**Max.**		**Min.**	**Max.**
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

6 Revision history

Table 10: Document revision history

Date	Revision	Changes
15-Jan-2014	1	First release

Please Read Carefully

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.