STB155N3LH6
STD155N3LH6

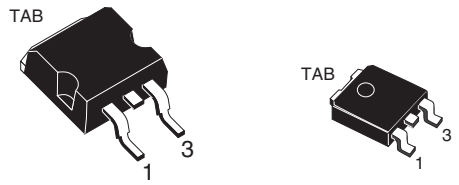
N-channel 30 V, 2.4 mΩ, 80 A, D²PAK, DPAK STripFET™VI DeepGATE™ Power MOSFET

Features

Order codes	V_{DSS}	$R_{DS(on)}$ max	I_D(1)	P_{TOT}
STB155N3LH6	30 V	3.0 mΩ	80 A	110 W
STD155N3LH6				

1. Current limited by package

- 100% avalanche tested
- Logic level drive



D²PAK DPAK

Applications

- Switching applications
- Automotive

Description

These devices are N-channel Power MOSFETs developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFETs exhibits the lowest $R_{DS(on)}$ in all packages.

Figure 1. Internal schematic diagram

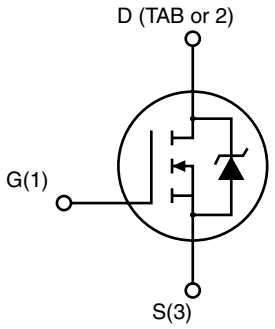


Table 1. Device summary

Order codes	Marking	Package	Packaging
STB155N3LH6	155N3LH6	D²PAK	Tape and reel
STD155N3LH6		DPAK	

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	30	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	80	A
I_D	Drain current (continuous) at T_C = 100 °C	80	A
I_{DM} (2)	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at T_C = 25 °C	110	W
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Operating junction temperature		°C

1. Limited by wire bonding.
2. Pulse width limited by safe operating area.

Table 3. Thermal resistance

Symbol	Parameter	Value		Unit
		D^2PAK	DPAK	
$R_{thj\text{-}case}$	Thermal resistance junction-case max	1.36		°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb max	35	50	°C/W

1. When mounted on 1 $inch^2$ OZ Cu board.

Table 4. Thermal resistance

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current	40	A
E_{AS} (1)	Single pulse avalanche energy	525	mJ

1. Starting Tj = 25°C, I_D = 40 A, V_{DD} = 25 V

2 Electrical characteristics

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

Table 5. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage (V_{GS}= 0)	I_D = 250 µA	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 30 V V_{DS} = 30 V,Tc = 125 °C			1 10	µA 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		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10 V, I_D = 40 A		2.4	3.0	mΩ
		V_{GS} = 5 V, I_D = 40 A		3.2	4.0	mΩ

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V, f=1 MHz, V_{GS} = 0	-	3800 725 420	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 15 V, I_D = 80 A V_{GS} = 10 V *(see Figure 14)*	-	80 15 15	-	nC nC nC
R_G	Gate input resistance	f = 1 MHz gate bias Bias = 0 test signal level = 20 mV open drain	-	1.5	-	Ω

Table 7. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD} = 15 V, I_D = 40 A, R_G = 4.7 Ω, V_{GS} = 10 V *(see Figure 15)*	-	15 85	-	ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD} = 15 V, I_D = 40 A, R_G = 4.7 Ω, V_{GS} = 10 V *(see Figure 15)*	-	100 40	-	ns ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)		-		80 320	A A
V_{SD}(2)	Forward on voltage	I_{SD} = 40 A, V_{GS} = 0	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 80 A, di/dt = 100 A/µs, V_{DD} = 24 V *(see Figure 17)*	-	35 26.5 1.7		ns nC 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

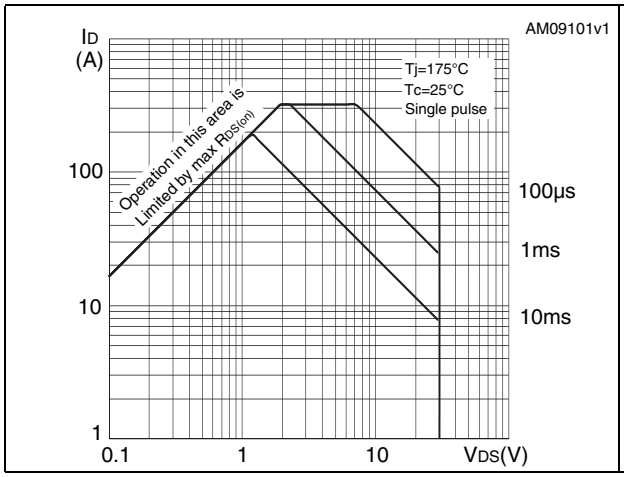


Figure 3. Thermal impedance

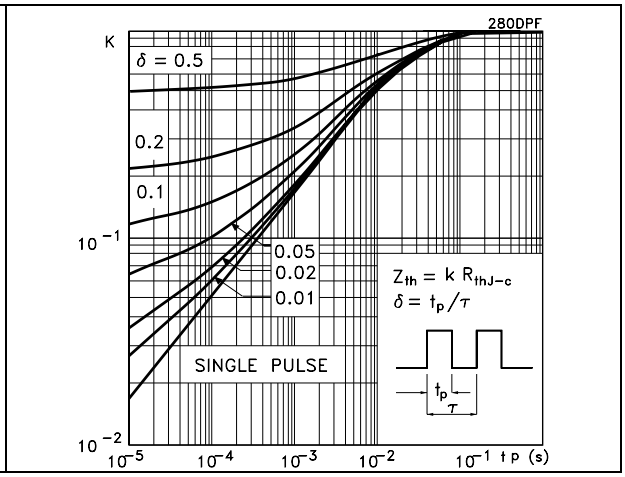


Figure 4. Output characteristics

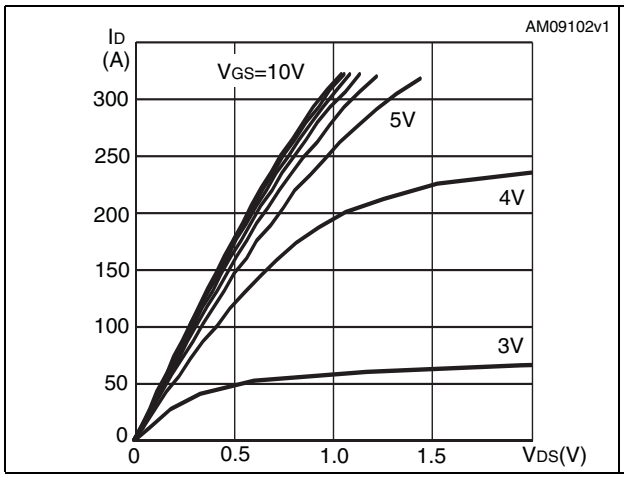


Figure 5. Transfer characteristics

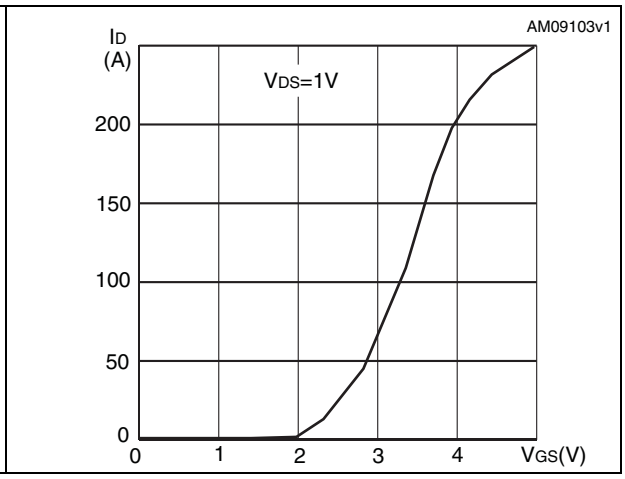


Figure 6. Normalized B_{VDSS} vs temperature

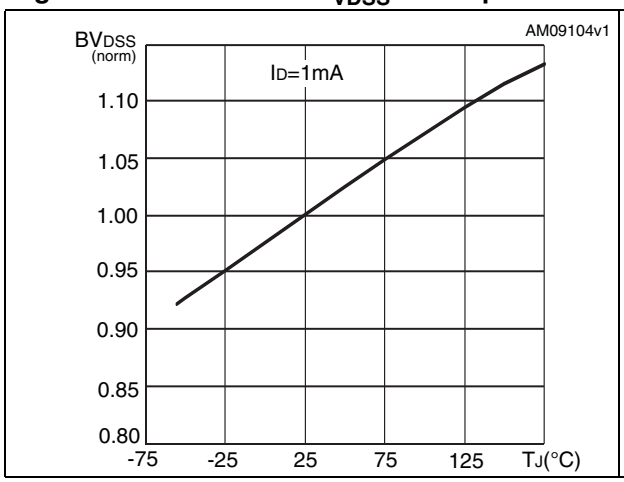


Figure 7. Static drain-source on resistance

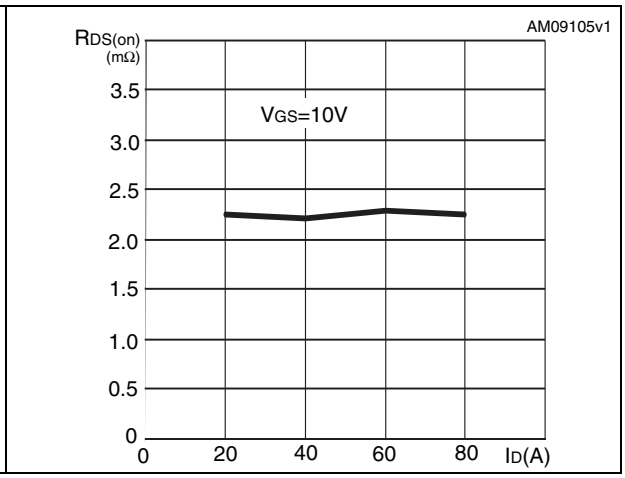


Figure 8. Gate charge vs gate-source voltage

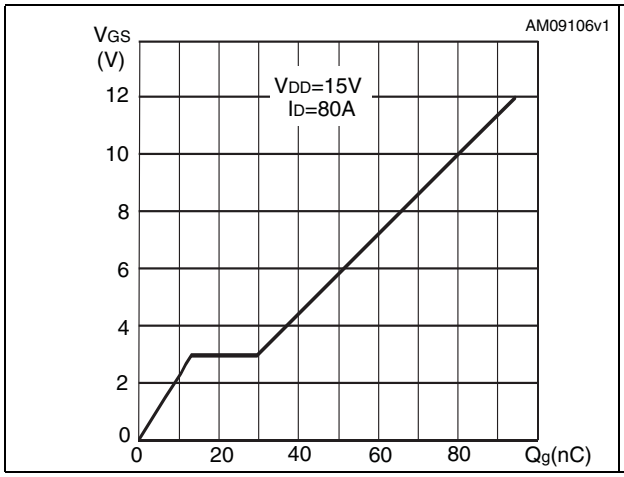


Figure 9. Capacitance variations

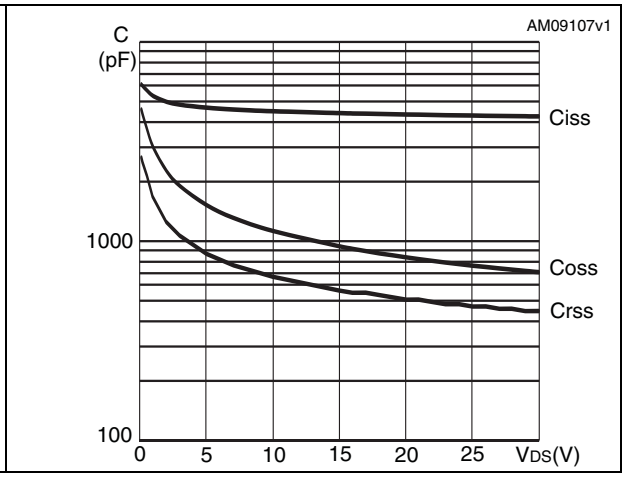


Figure 10. Normalized gate threshold voltage vs temperature

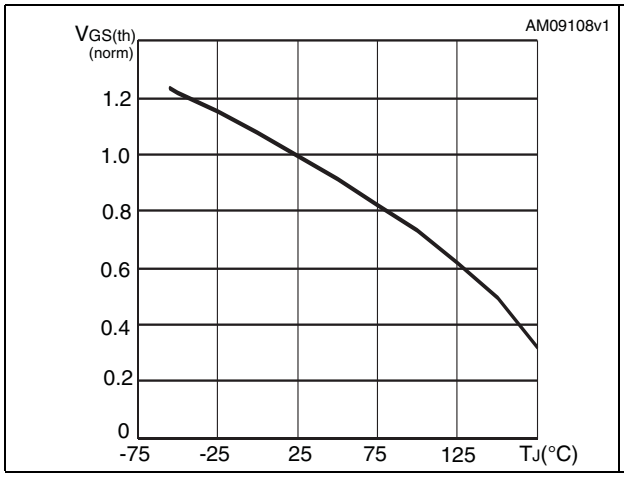


Figure 11. Normalized on resistance vs temperature

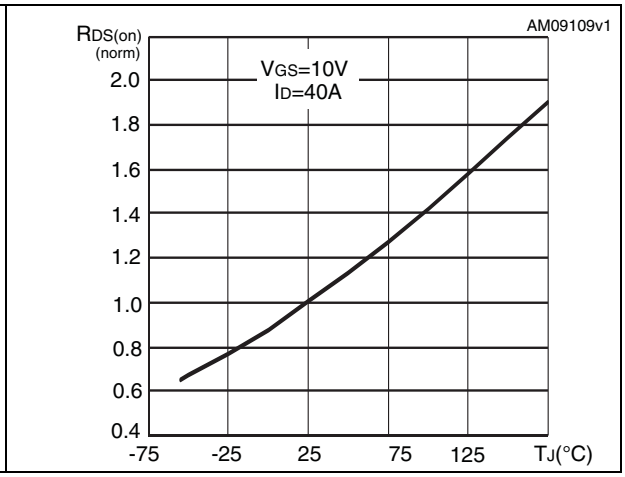
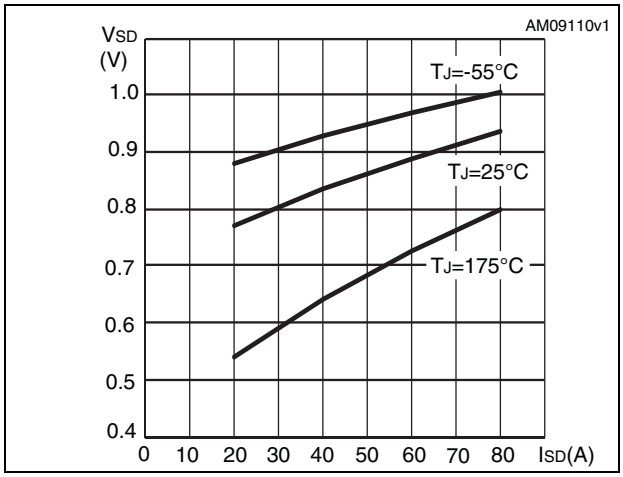


Figure 12. Source-drain diode forward characteristics



3 Test circuits

Figure 13. Switching times test circuit for resistive load

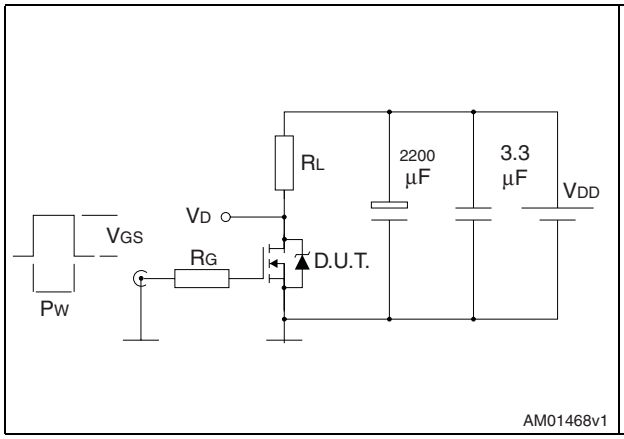


Figure 14. Gate charge test circuit

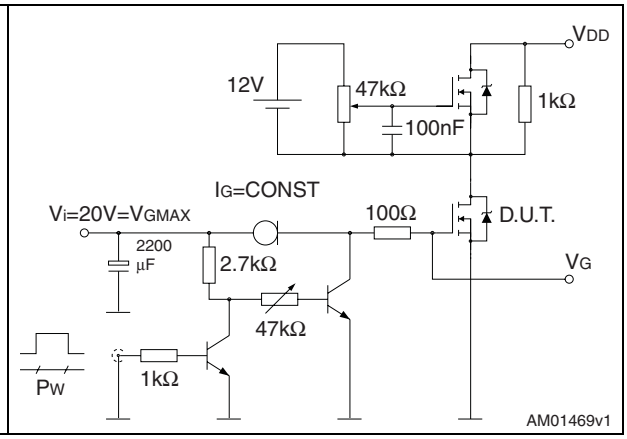


Figure 15. Test circuit for inductive load switching and diode recovery times

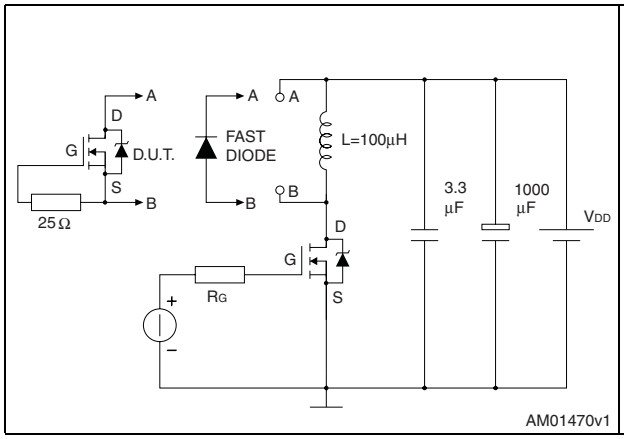


Figure 16. Unclamped Inductive load test circuit

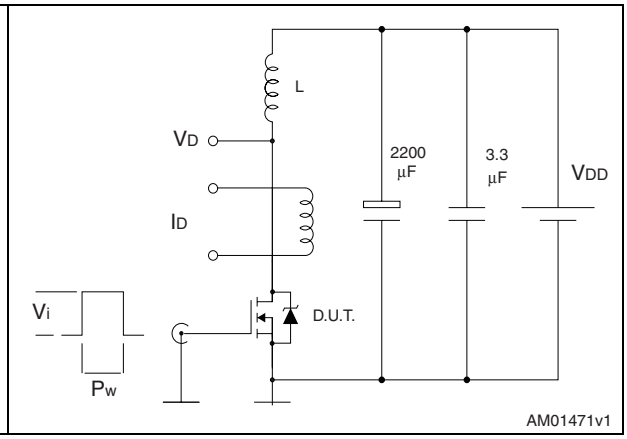


Figure 17. Unclamped inductive waveform

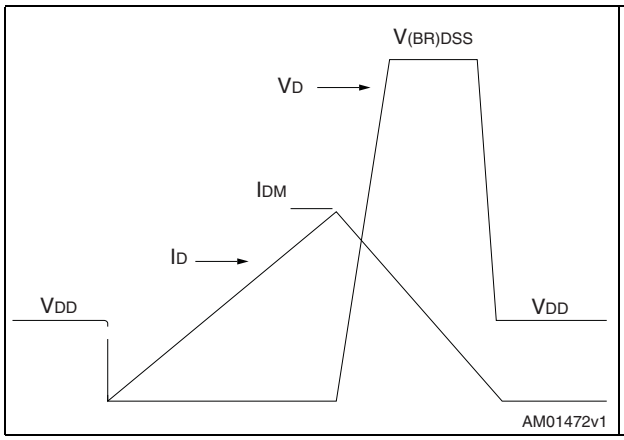
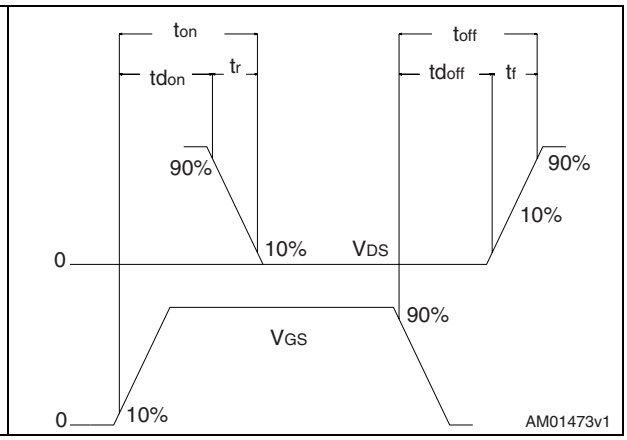


Figure 18. Switching time waveform



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.

Table 9. D²PAK (TO-263) mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
c	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50		
E	10		10.40
E1	8.50		
e		2.54	
e1	4.88		5.28
H	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.4	
V2	0°		8°

Figure 19. D²PAK (TO-263) drawing

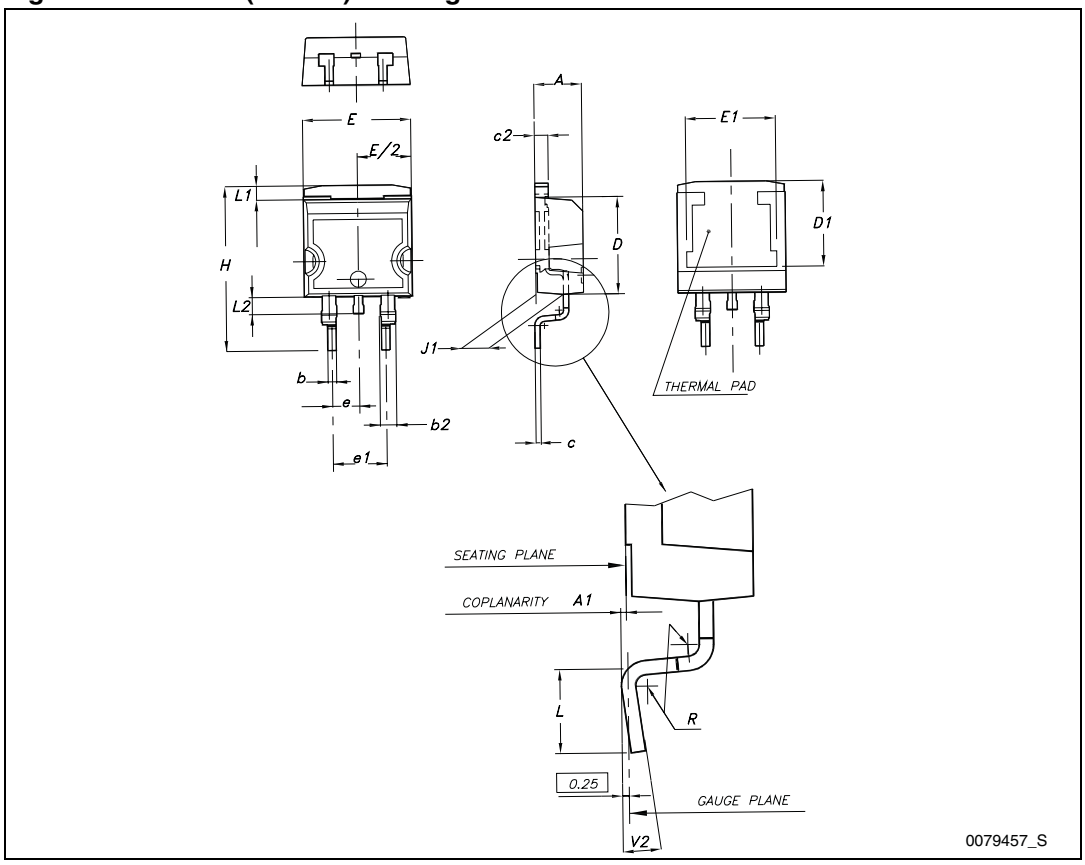
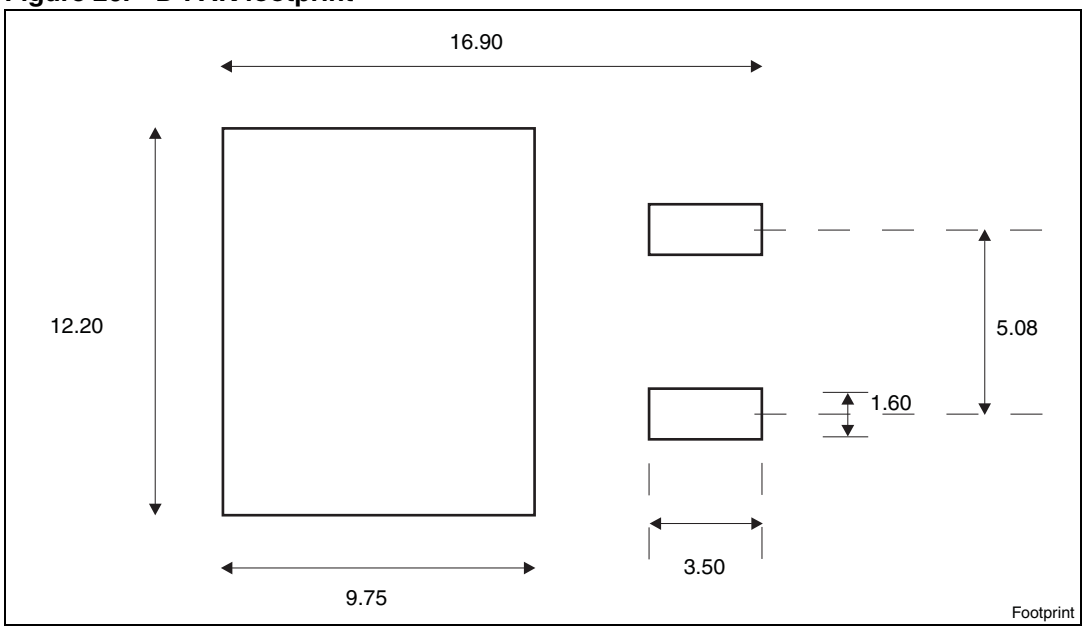


Figure 20. D²PAK footprint[a]



a. All dimension are in millimeters

Table 10. 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		1.50
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°

Figure 21. DPAK (TO-252) drawing

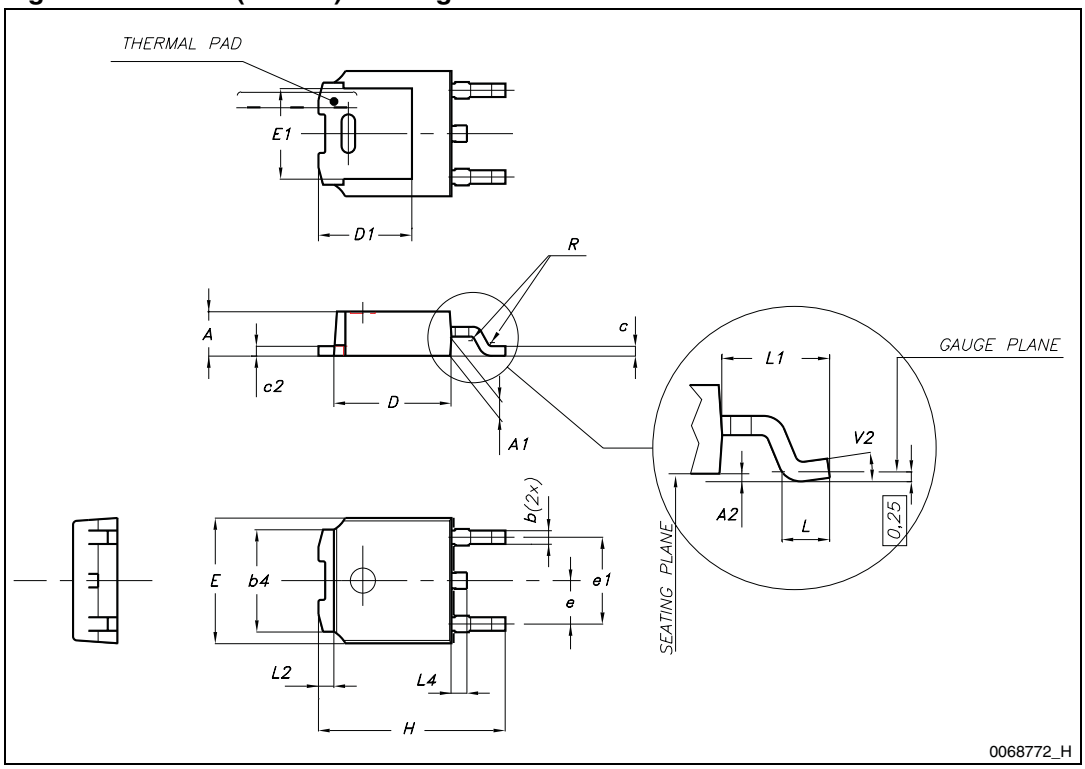
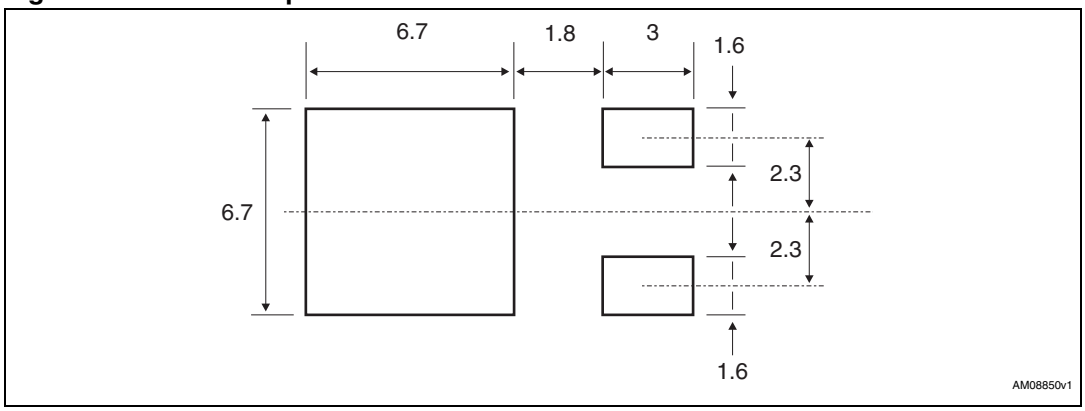


Figure 22. DPAK footprint[(b)]



b. All dimension are in millimeters

5 Packaging mechanical data

Table 11. D²PAK (TO-263) tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	10.5	10.7	A		330
B0	15.7	15.9	B	1.5	
D	1.5	1.6	C	12.8	13.2
D1	1.59	1.61	D	20.2	
E	1.65	1.85	G	24.4	26.4
F	11.4	11.6	N	100	
K0	4.8	5.0	T		30.4
P0	3.9	4.1			
P1	11.9	12.1	Base qty		1000
P2	1.9	2.1	Bulk qty		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

Table 12. 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

Table 12. DPAK (TO-252) tape and reel mechanical data (continued)

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 23. Tape for D²PAK (TO-263) and DPAK (TO-252)

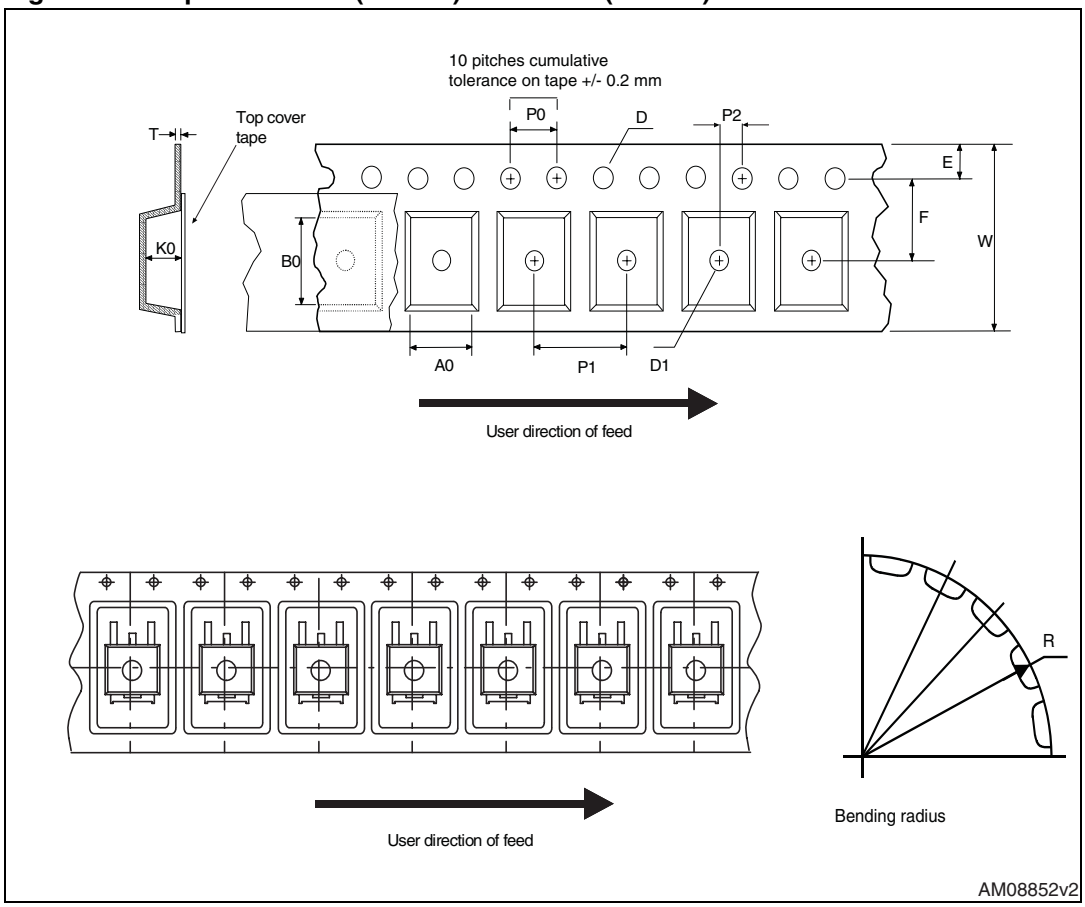
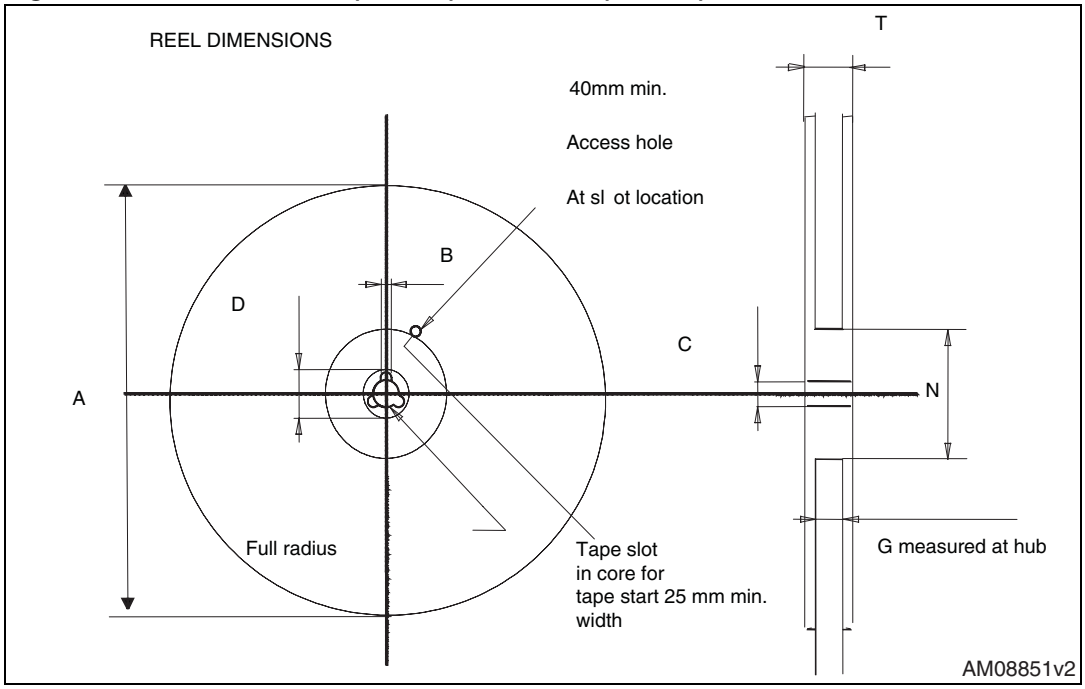


Figure 24. Reel for D²PAK (TO-263) and DPAK (TO-252)



6 Revision history

Table 13. Document revision history

Date	Revision	Changes
02-Sep-2010	1	First release.
12-Apr-2011	2	Document status promoted from preliminary data to datasheet.
27-Sep-2011	3	Updated *Table 1: Device summary*, *Figure 2: Safe operating area* and *Section 4: Package mechanical data*. Minor text changes.

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