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Geelead Technology Limited
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STD35NF06L

N-channel 60 V, 0.014 Ω, 35 A STripFET™ II Power MOSFET in a DPAK package

Datasheet — production data

Features

Order code	V_{DSS}	$R_{DS(on)}$	I_D
STD35NF06LT4	60V	<0.017Ω	35A

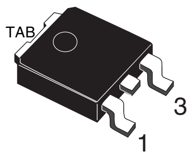
- Low threshold drive
- Gate charge minimized

Applications

- Switching application

Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.



DPAK

Figure 1. Internal schematic diagram

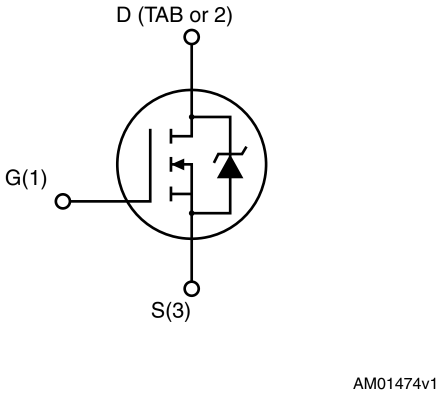


Table 1. Device summary

Order code	Marking	Package	Packaging
STD35NF06LT4	D35NF06L	DPAK	Tape and reel

This is information on a product in full production.

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	60	V
V_{DGR}	Drain-gate voltage (R_{GS} = 20 kΩ)	60	V
V_{GS}	Gate- source voltage	± 16	V
I_D	Drain current (continuous) at T_C = 25 °C	35	A
I_D	Drain current (continuous) at T_C = 100 °C	24.5	A
I_{DM}(1)	Drain current (pulsed)	140	A
P_{tot}	Total dissipation at T_C = 25 °C	80	W
	Derating Factor	0.53	W/°C
dv/dt(2)	Peak diode recovery avalanche energy	5	V/ns
E_{AS} (3)	Single pulse avalanche energy	280	mJ
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Max. operating junction temperature		

1. Pulse width limited by safe operating area.
2. $I_{SD} \leq 35$ A, di/dt ≤ 100 A/µs, $V_{DD} = V_{(BR)DSS}$, $T_j \leq T_{JMAX}$
3. Starting T_j = 25 °C, I_D = 30 A, V_{DD} =30 V

Table 3. Thermal data

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	1.88	°C/W
Rthj-amb	Thermal resistance junction-to ambient max	100	°C/W
T_J	Maximum lead temperature for soldering purpose	275	°C

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 = 250 µA, V_{GS} =0	60			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 60 V V_{DS} = 60 V, T_C = 125 °C			1 10	µA µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ± 16 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 = 17.5 A V_{GS} = 4.5 V, I_D = 17.5 A		0.014 0.016	0.017 0.020	Ω Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} = 15 V, I_D = 17.5 A	-	28		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V, f = 1 MHz, V_{GS} = 0	-	1700 305 105		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 30 V, I_D = 27.5 A R_G = 4.7 Ω V_{GS} = 4.5 V (see *Figure 13*)	-	20 100 40 20		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 48 V, I_D = 55 A, V_{GS} = 4.5 V, R_G = 4.7 Ω (see *Figure 14*)	-	25 5 10	33	nC nC nC

1. Pulsed: pulse duration = 300 µs, duty cycle 1.5%.

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)		-		35 140	A A
V_{SD} (2)	Forward on voltage	I_{SD} = 35 A, V_{GS} = 0	-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 35 A, di/dt = 100 A/µs, V_{DD} = 30 V, T_j = 150 °C (see *Figure 15*)	-	80 200 5		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

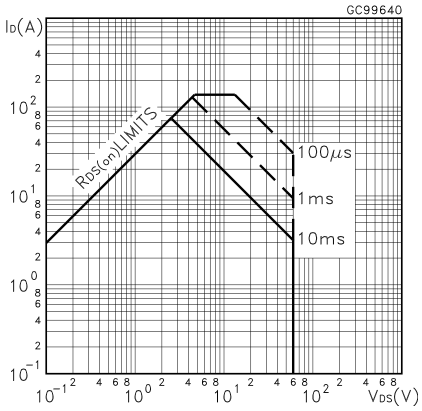


Figure 3. Thermal impedance

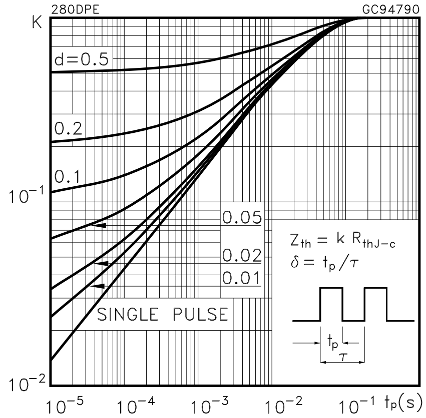


Figure 4. Output characteristics

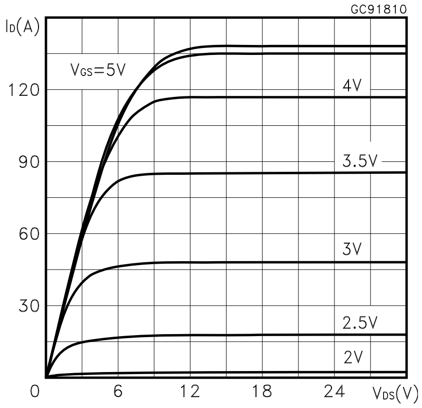


Figure 5. Transfer characteristics

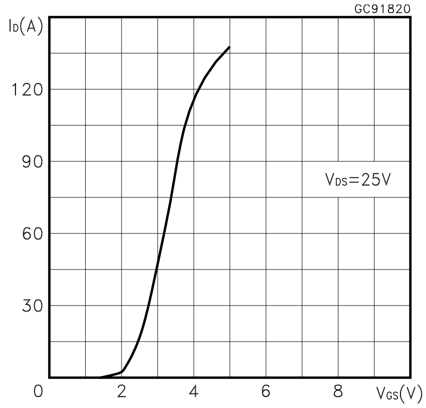


Figure 6. Transconductance

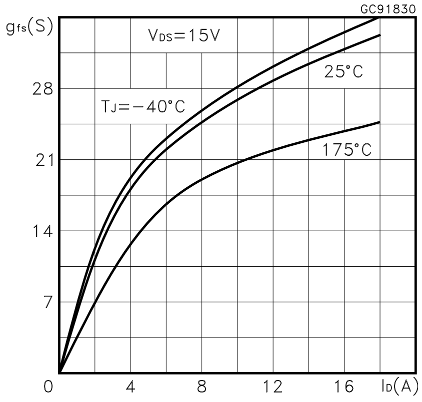


Figure 7. Static drain-source on-resistance

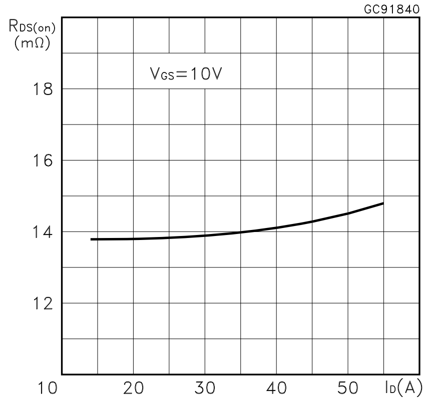


Figure 8. Gate charge vs. gate-source voltage

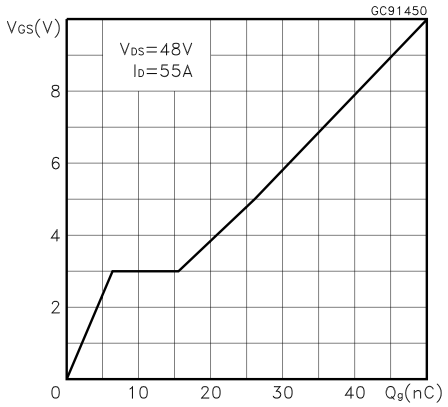


Figure 9. Capacitance variations

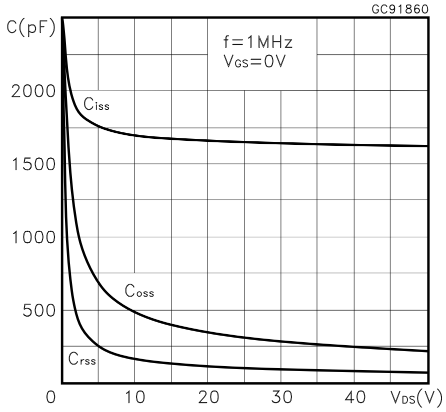


Figure 10. Normalized gate threshold voltage vs. temperature

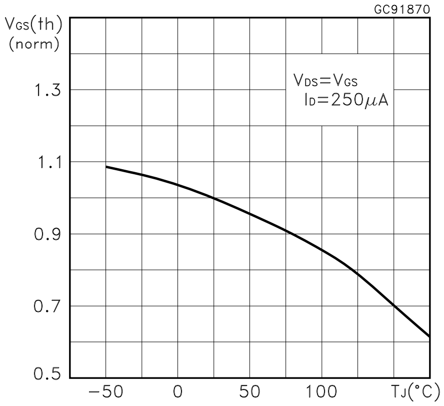


Figure 11. Normalized on-resistance vs. temperature

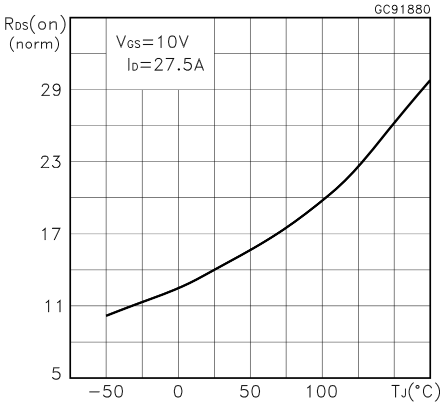
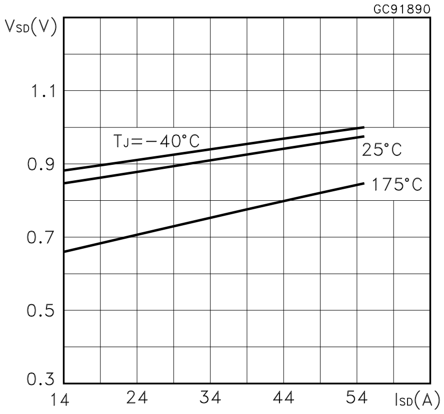


Figure 12. Source-drain diode forward characteristics



3 Test circuit

Figure 13. Switching times test circuit for resistive load

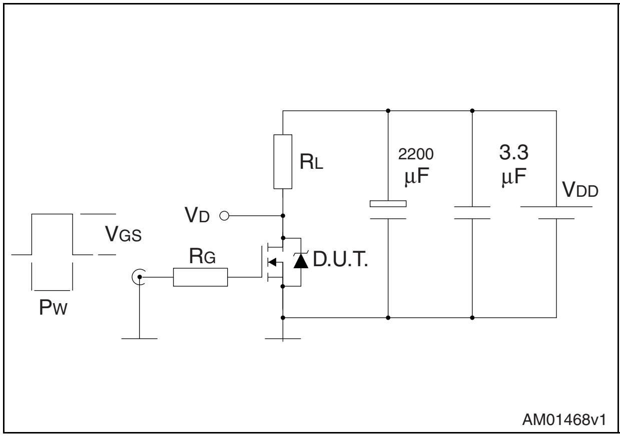


Figure 14. Gate charge test circuit

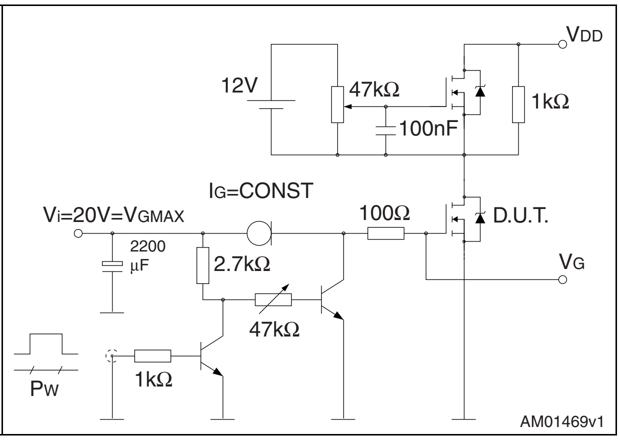


Figure 15. Test circuit for inductive load switching and diode recovery times

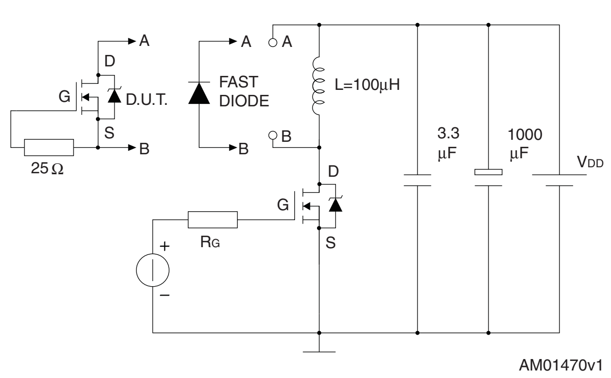


Figure 16. Unclamped Inductive load test circuit

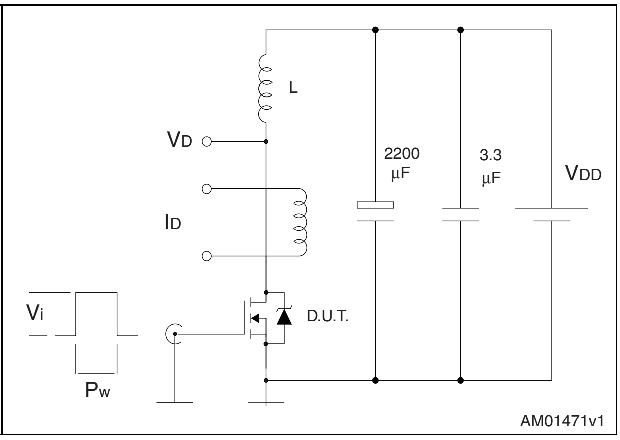


Figure 17. Unclamped inductive waveform

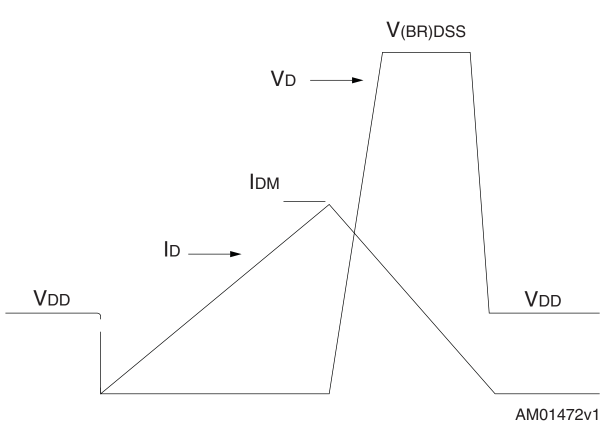
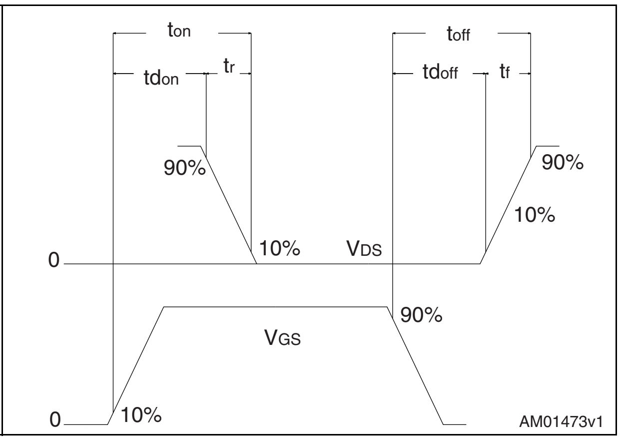


Figure 18. Switching time waveform



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 7. 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 19. DPAK (TO-252) drawing

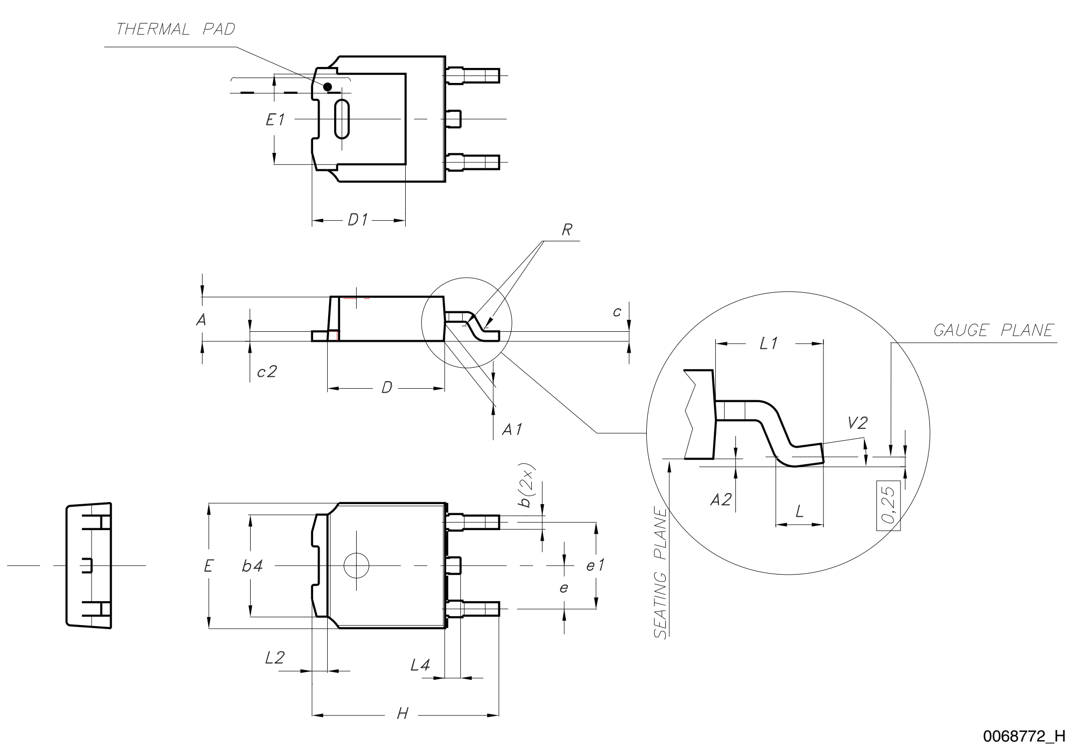
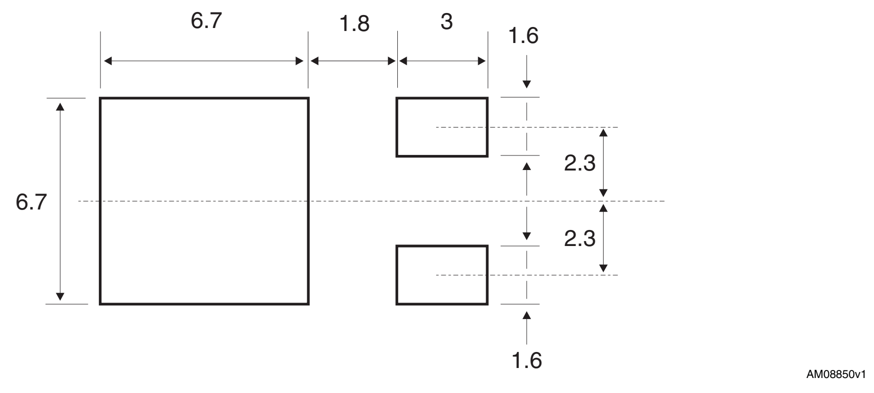


Figure 20. DPAK footprint[a]



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[a] All dimension are in millimeters

5 Packing mechanical data

Table 8. 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			

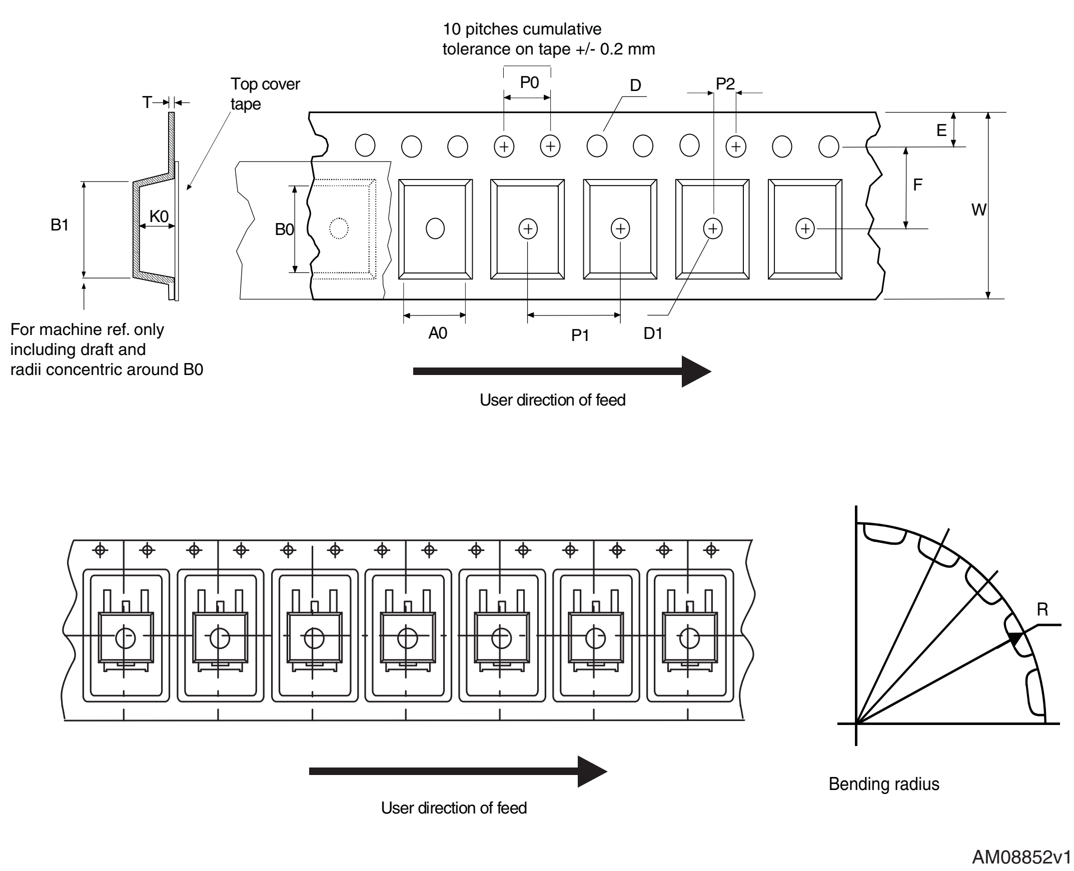

Figure 21. Tape for DPAK (TO-252)

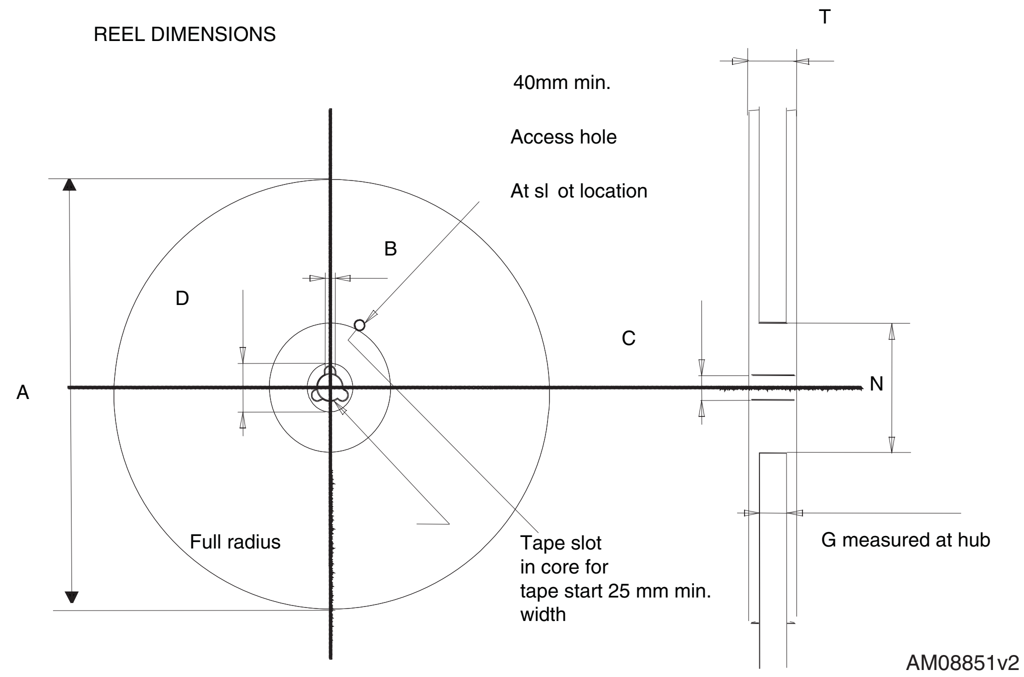

Figure 22. Reel for DPAK (TO-252)

6 Revision history

Table 9. Revision history

Date	Revision	Changes
21-Jun-2004	2	Preliminary version
06-Jul-2006	3	New template, no content change
20-Feb-2007	4	Typo mistake on page 1
19-Apr-2012	5	Added new value in *Table 4: On/off states* ($V_{GS(th)}$ max). Minor text changes.

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