

## Automotive-grade N-channel 60 V, 0.022 $\Omega$ typ., 35 A STripFET™ II Power MOSFET in a DPAK package

Datasheet - production data

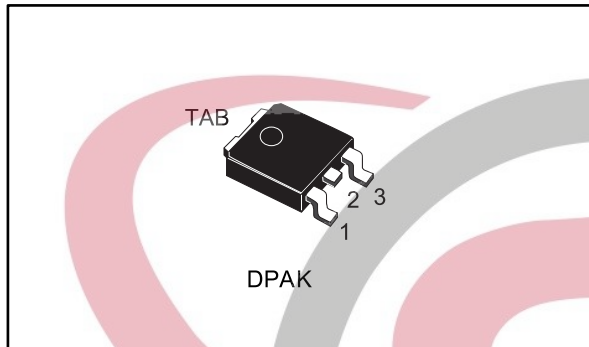
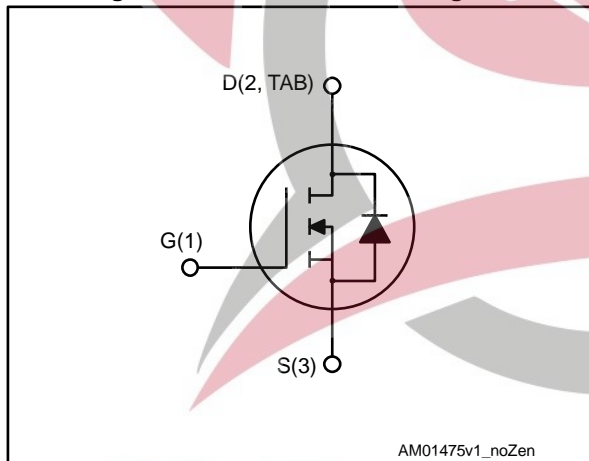


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STD30NF06LAG	60 V	0.028 $\Omega$	35 A

- AEC-Q101 qualified
- Low threshold drive
- Gate charge minimized



### Applications

- Switching applications

### Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process is specifically designed to minimize input capacitance and gate charge. It is therefore ideal as a primary switch in advanced high-efficiency isolated DC-DC converters for Telecom and Computer applications. It is also suitable for any application with low gate charge drive requirements.

Table 1: Device summary

Order code	Marking	Package	Packing
STD30NF06LAG	D30NF06L	DPAK	Tape and reel

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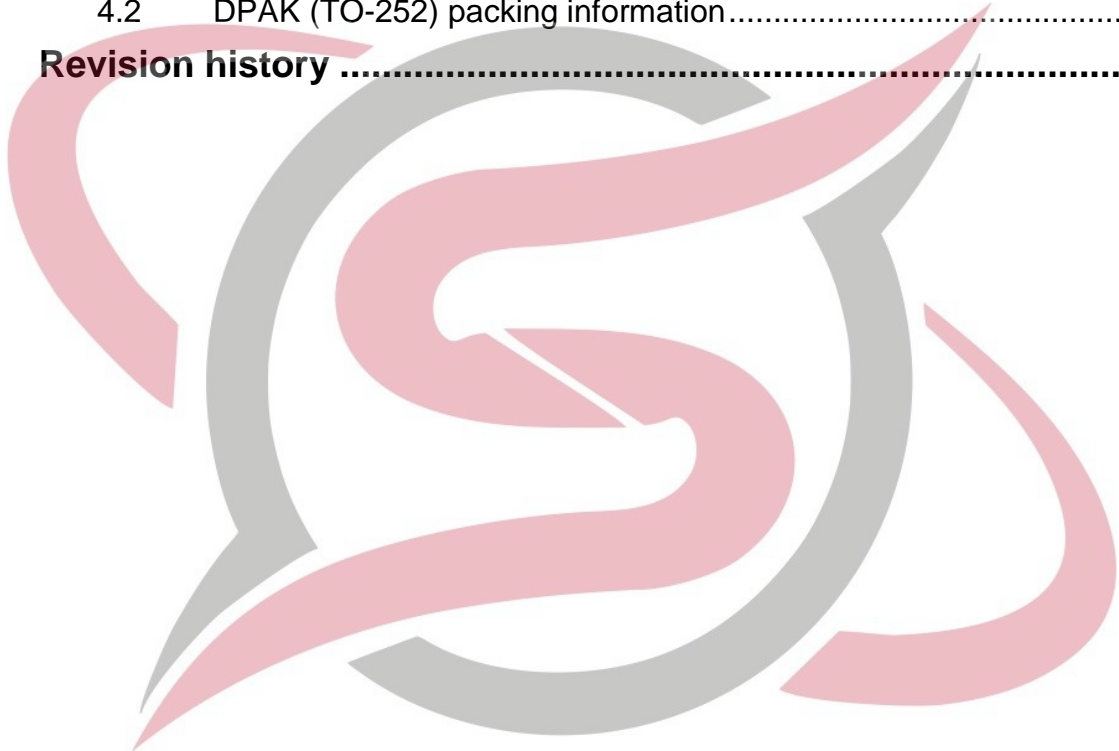
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# 1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$V_{DGR}$	Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	60	V
$I_D$	Drain current (continuous) at $T_{case} = 25 \text{ }^\circ\text{C}$	35	A
$I_D$	Drain current (continuous) at $T_{case} = 100 \text{ }^\circ\text{C}$	25	
$I_{DM}^{(1)}$	Drain current (pulsed)	140	A
$P_{TOT}$	Total dissipation at $T_{case} = 25 \text{ }^\circ\text{C}$	70	W
$dv/dt^{(2)}$	Peak diode recovery voltage slope	25	V/ns
$T_{stg}$	Storage temperature range	-55 to 175	$^\circ\text{C}$
$T_j$	Operating junction temperature range		

**Notes:**

(1) Pulse width is limited by safe operating area.

(2)  $I_{SD} \leq 35 \text{ A}$ ,  $di/dt \leq 400 \text{ A}/\mu\text{s}$ ,  $V_{DS(peak)} \leq V_{(BR)DSS}$

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	2.14	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	50	

**Notes:**

(1) When mounted on a 1-inch<sup>2</sup> FR-4, 2 Oz copper board.

Table 4: Avalanche characteristics

Symbol	Parameter	Value	Unit
$I_{AR}$	Avalanche current, repetitive or not repetitive (pulse width limited by $T_{jmax}$ )	35	A
$E_{AS}$	Single pulse avalanche energy (starting $T_j=25^\circ\text{C}$ , $I_D=I_{AR}$ , $V_{DD}=50 \text{ V}$ )	150	mJ

## 2 Electrical characteristics

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

**Table 5: Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source breakdown voltage	$V_{\text{GS}} = 0\text{ V}$ , $I_{\text{D}} = 250\text{ }\mu\text{A}$	60			V
$I_{\text{DSS}}$	Zero gate voltage drain current	$V_{\text{GS}} = 0\text{ V}$ , $V_{\text{DS}} = 60\text{ V}$			1	$\mu\text{A}$
		$V_{\text{GS}} = 0\text{ V}$ , $V_{\text{DS}} = 60\text{ V}$ , $T_{\text{case}} = 125\text{ °C}$ <sup>(1)</sup>			10	
$I_{\text{GSS}}$	Gate-body leakage current	$V_{\text{DS}} = 0\text{ V}$ , $V_{\text{GS}} = \pm 20\text{ V}$			$\pm 100$	nA
$V_{\text{GS(th)}}$	Gate threshold voltage	$V_{\text{DS}} = V_{\text{GS}}$ , $I_{\text{D}} = 250\text{ }\mu\text{A}$	1	1.7	2.5	V
$R_{\text{DS(on)}}$	Static drain-source on-resistance	$V_{\text{GS}} = 10\text{ V}$ , $I_{\text{D}} = 18\text{ A}$		0.022	0.028	$\Omega$
		$V_{\text{GS}} = 5\text{ V}$ , $I_{\text{D}} = 18\text{ A}$		0.025	0.030	

**Notes:**

<sup>(1)</sup>Defined by design, not subject to production test.

**Table 6: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{\text{iss}}$	Input capacitance	$V_{\text{DS}} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{\text{GS}} = 0\text{ V}$	-	1600		pF
$C_{\text{oss}}$	Output capacitance		-	215		
$C_{\text{riss}}$	Reverse transfer capacitance		-	60		
$Q_{\text{g}}$	Total gate charge	$V_{\text{DD}} = 48\text{ V}$ , $I_{\text{D}} = 35\text{ A}$ , $V_{\text{GS}} = 5\text{ V}$ (see <a href="#">Figure 15</a> : "Test circuit for inductive load switching and diode recovery times")	-	23	31	nC
$Q_{\text{gs}}$	Gate-source charge		-	7		
$Q_{\text{gd}}$	Gate-drain charge		-	10		

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Table 7: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$ , $I_D = 18\text{ A}$ , $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	30	-	ns
$t_r$	Rise time		-	105	-	
$t_{d(off)}$	Turn-off delay time		-	65	-	
$t_f$	Fall time		-	25	-	

Table 8: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		35	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		140	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS} = 0\text{ V}$ , $I_{SD} = 35\text{ A}$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 35\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 15\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$ (see <a href="#">Figure 18: "Switching time waveform"</a> )	-	70		ns
$Q_{rr}$	Reverse recovery charge		-	140		nC
$I_{RRM}$	Reverse recovery current		-	4		A

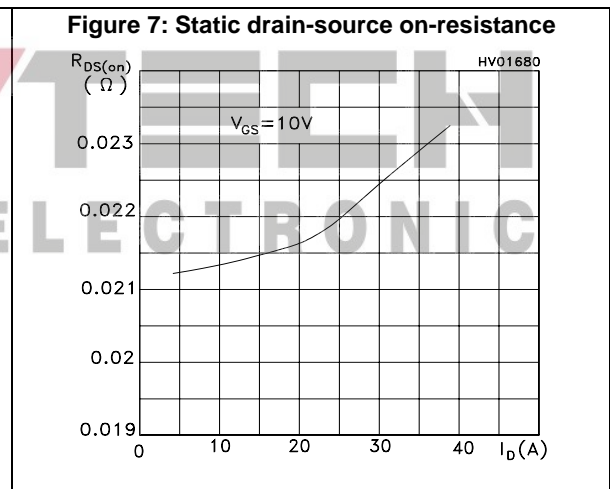
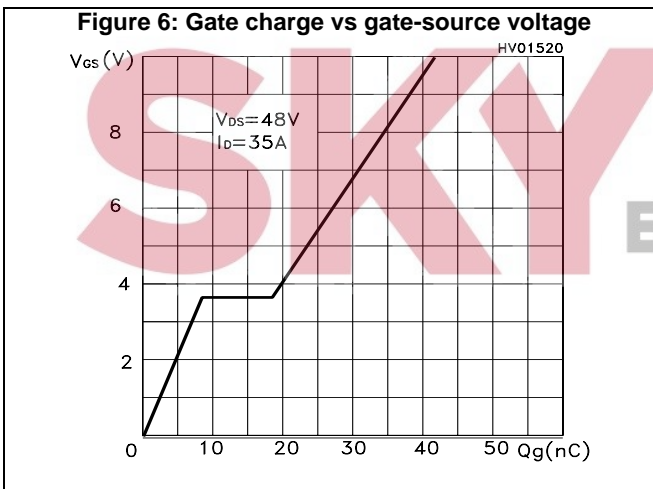
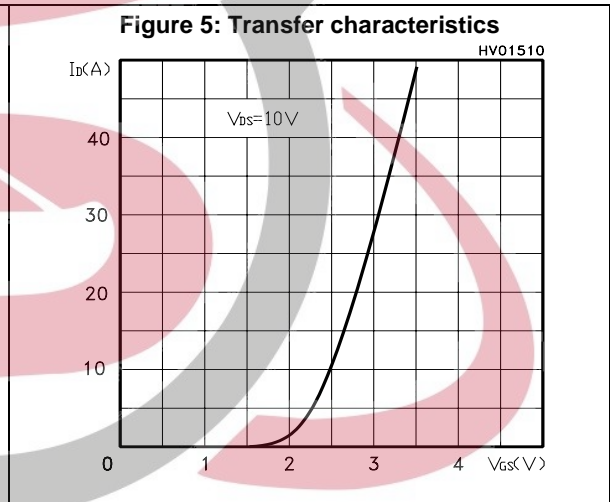
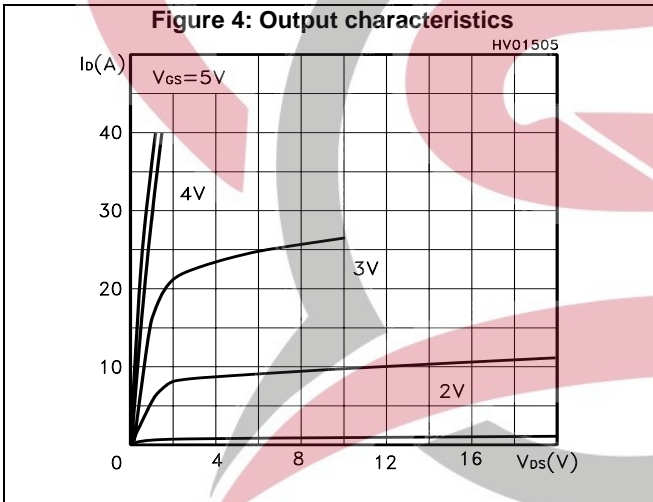
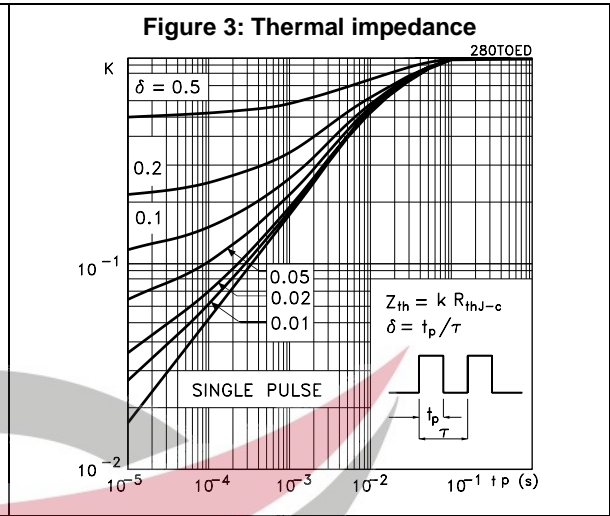
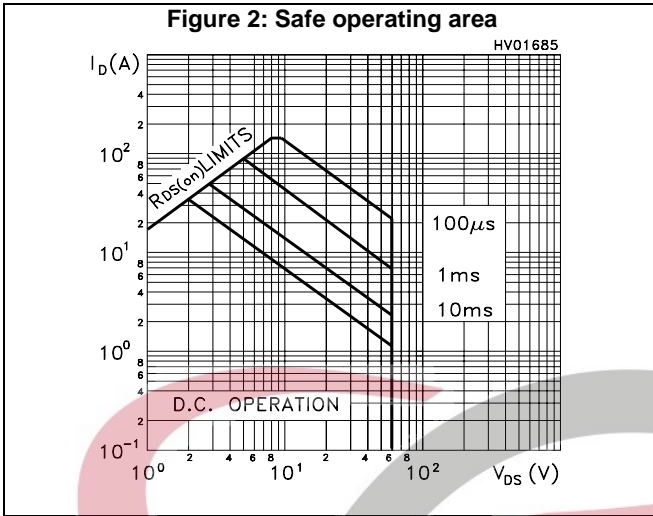
**Notes:**

- (1) Pulse width is limited by safe operating area.  
(2) Pulse test: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

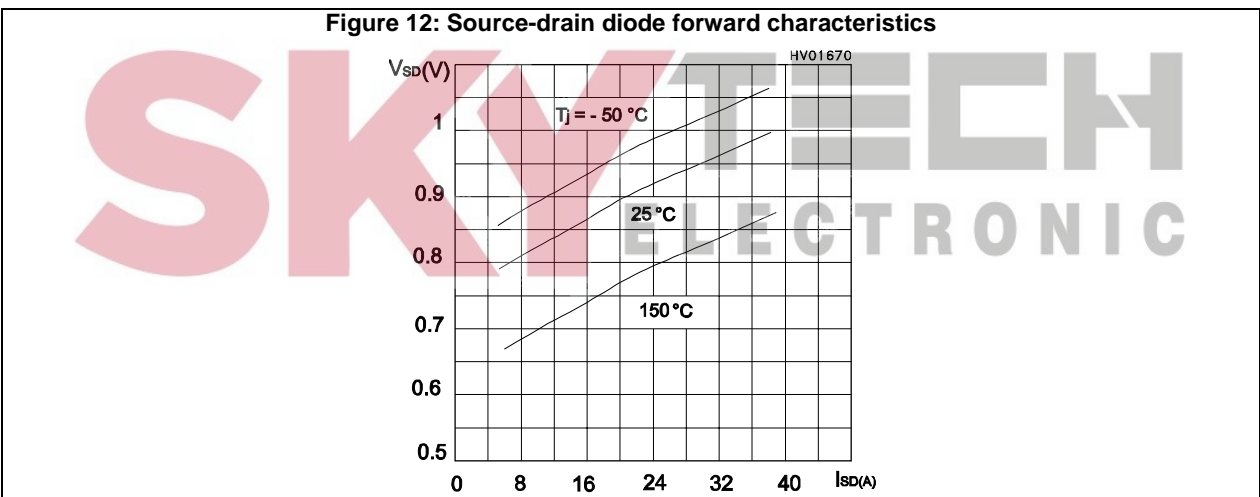
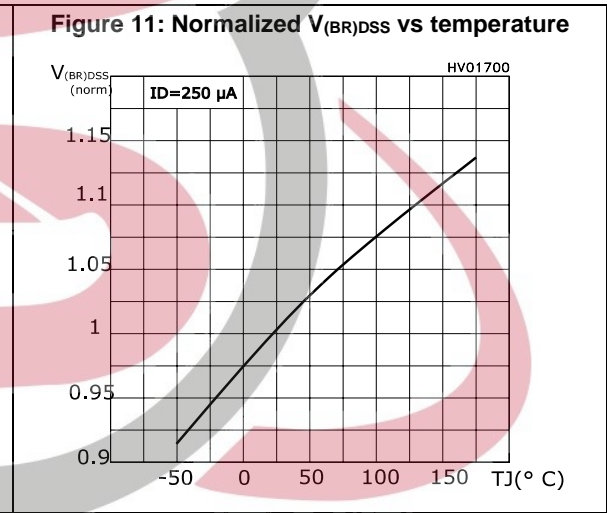
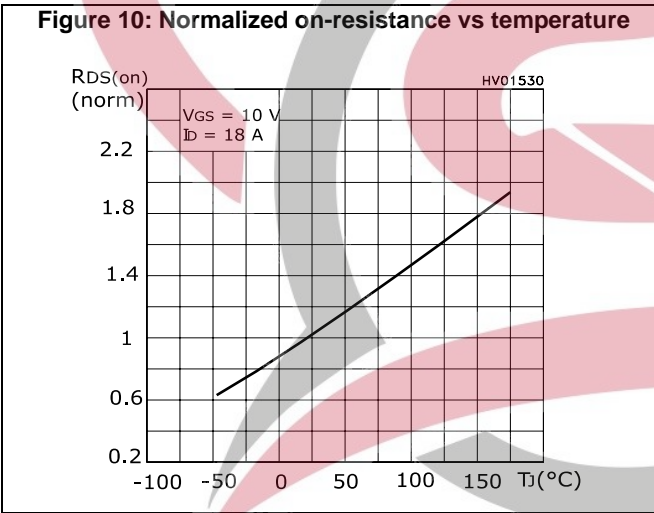
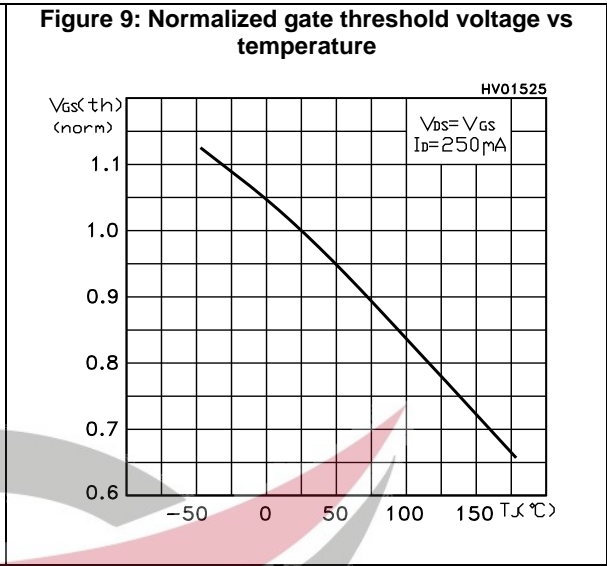
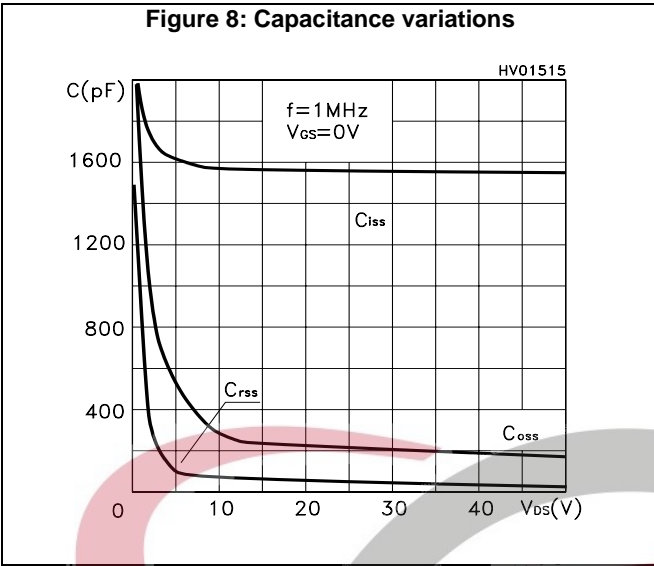


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## 2.1 Electrical characteristics (curves)

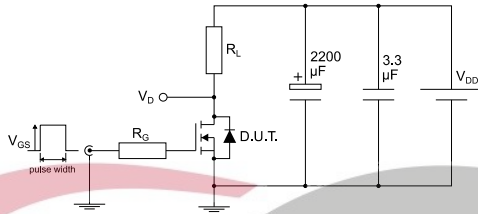






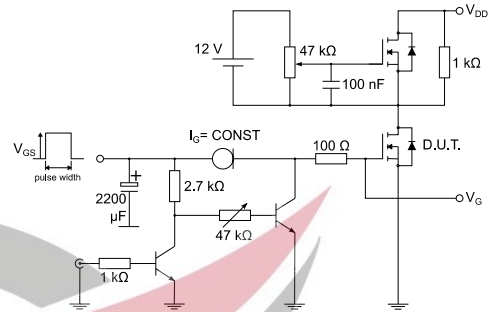
### 3 Test circuits

**Figure 13: Test circuit for resistive load switching times**



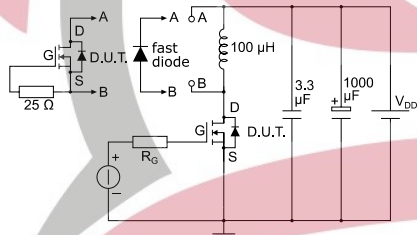
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**Figure 14: Test circuit for gate charge behavior**



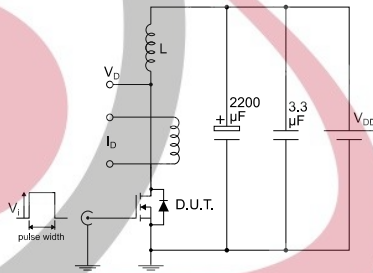
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



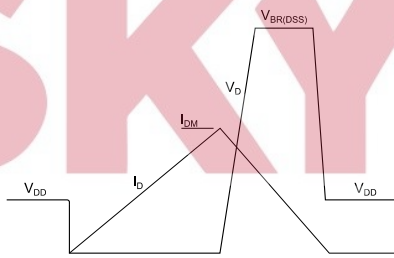
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**Figure 16: Unclamped inductive load test circuit**



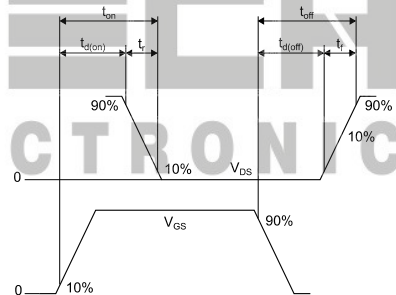
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**Figure 17: Unclamped inductive waveform**



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**Figure 18: Switching time waveform**



AM01473v1



## 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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 DPAK (TO-252) type A package information

Figure 19: DPAK (TO-252) type A package outline

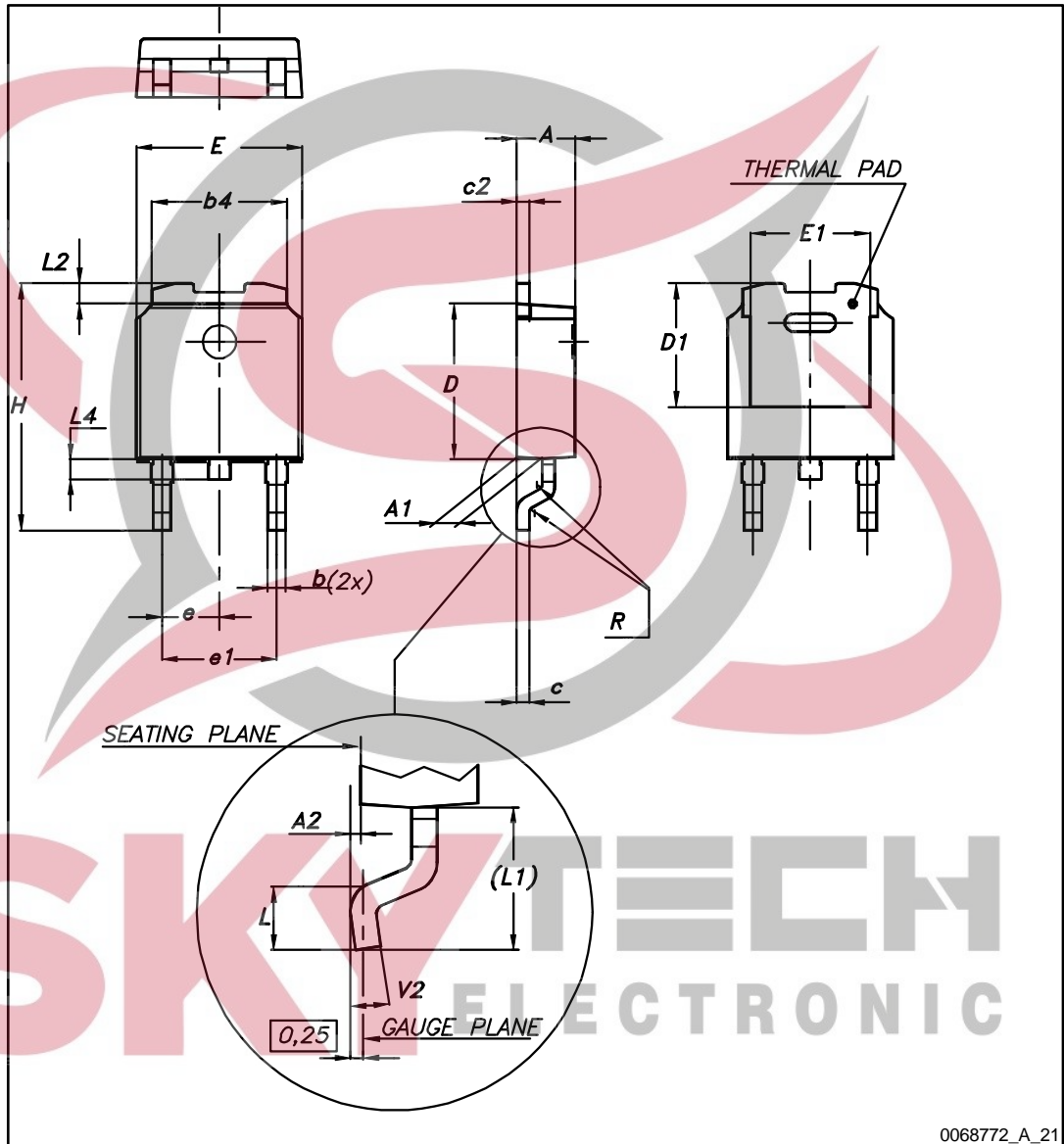
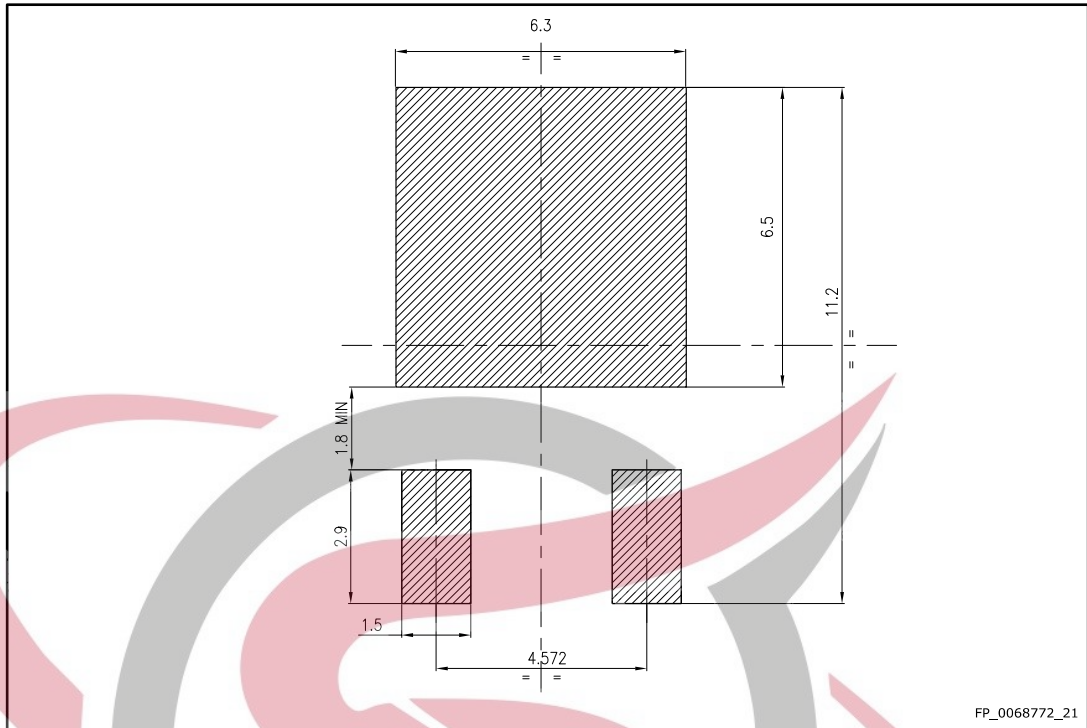


Table 9: DPAK (TO-252) type A mechanical data

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	4.95	5.10	5.25
E	6.40		6.60
E1	4.60	4.70	4.80
e	2.16	2.28	2.40
e1	4.40		4.60
H	9.35		10.10
L	1.00		1.50
(L1)	2.60	2.80	3.00
L2	0.65	0.80	0.95
L4	0.60		1.00
R		0.20	
V2	0°		8°

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Figure 20: DPAK (TO-252) recommended footprint (dimensions are in mm)



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### 4.2 DPAK (TO-252) packing information

Figure 21: DPAK (TO-252) tape outline

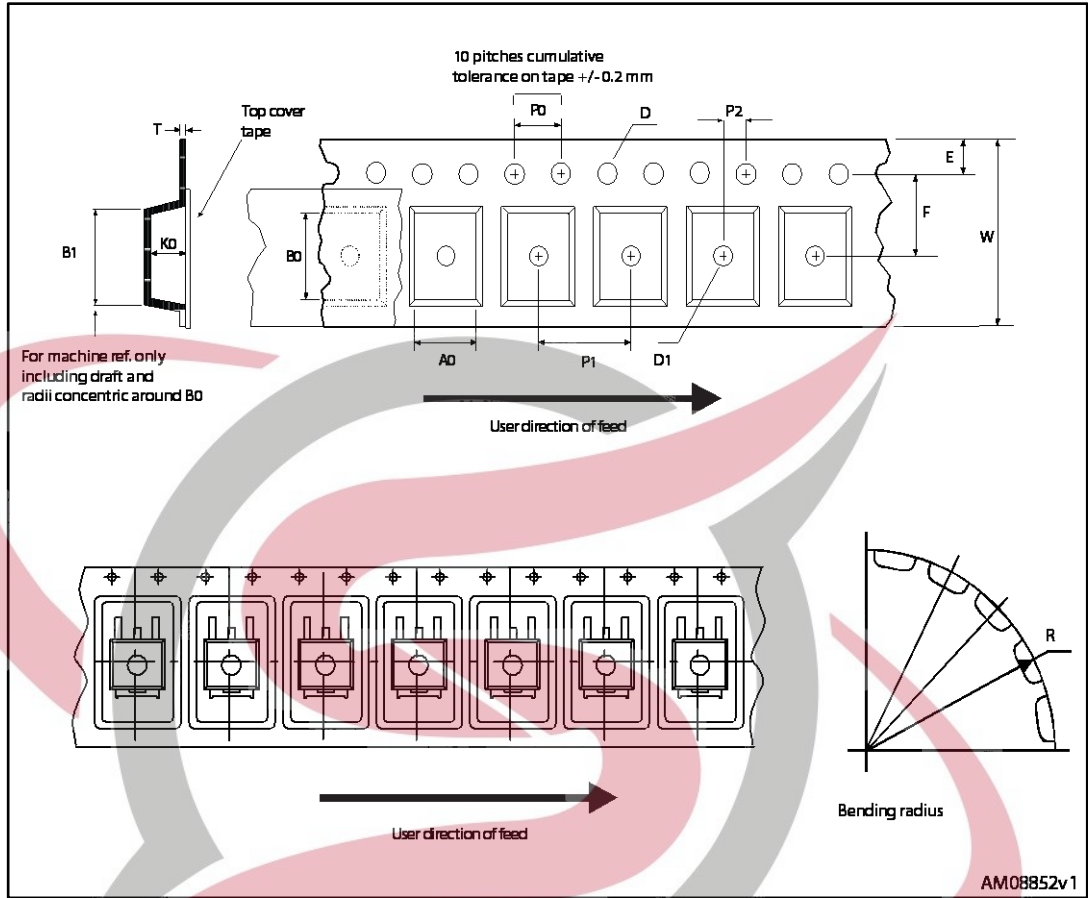


Figure 22: DPAK (TO-252) reel outline

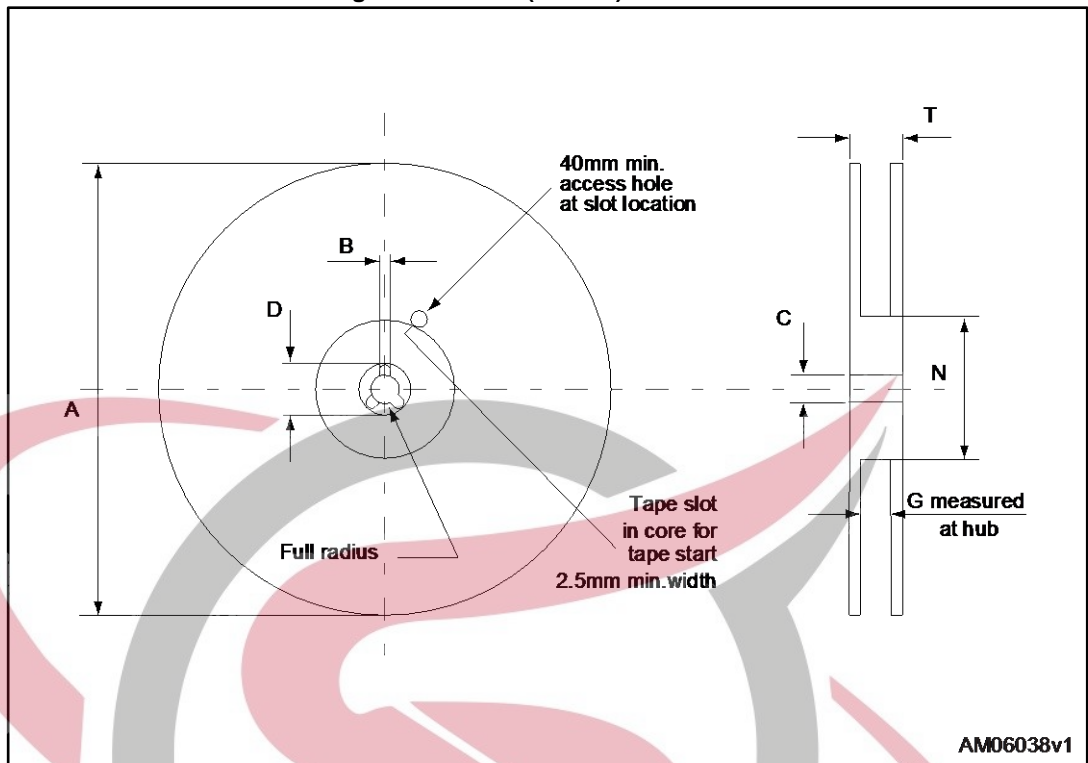


Table 10: DPAK (TO-252) tape and reel mechanical data

Dim.	Tape		Dim.	Reel	
	mm			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			

## 5 Revision history

Table 11: Document revision history

Date	Revision	Changes
01-Sep-2016	1	First release.
14-Feb-2017	2	Datasheet promoted from preliminary data to production data. Modified <i>Figure 9: "Normalized gate threshold voltage vs temperature"</i> . Minor text changes.





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