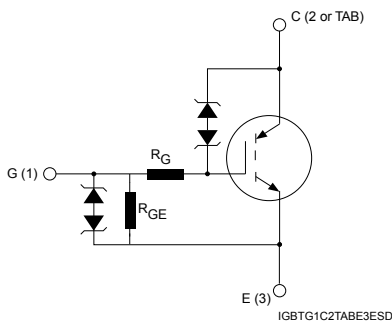
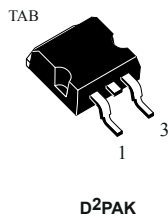



Automotive-grade 390 V internally clamped IGBT E<sub>SCIS</sub> 180 mJ


## Features

- AEC-Q101 qualified 
- SCIS energy of 180 mJ @ T<sub>C</sub> = 150 °C, L = 3 mH
- Parts are 100% tested in SCIS
- ESD gate-emitter protection
- Gate-collector high voltage clamping
- Logic level gate drive
- Very low saturation voltage
- High pulsed current capability
- Gate and gate-emitter resistor

## Applications

- Pencil coil electronic ignition driver

## Description

This application-specific IGBT utilizes the most advanced PowerMESH technology optimized for coil driving in the harsh environment of automotive ignition systems. The device shows very low on-state voltage and very high SCIS energy capability over a wide operating temperature range. Moreover, ESD-protected logic level gate input and an integrated gate resistor means no external protection circuitry is required.

## Product status link

[STGB18N40LZT4](#)

## Product summary

<b>Order code</b>	STGB18N40LZT4
<b>Marking</b>	GB18N40LZ
<b>Package</b>	D <sup>2</sup> PAK
<b>Packing</b>	Tape and reel

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{GE} = 0\text{ V}$ )	$V_{CES(\text{clamped})}$	V
$V_{ECS}$	Emitter-collector voltage ( $V_{GE} = 0\text{ V}$ )	20	V
$I_C$	Continuous collector current at $T_C = 100\text{ °C}$	30	A
$I_{CP}^{(1)}$	Pulsed collector current	40	A
$V_{GE}$	Gate-emitter voltage	$V_{GE(\text{clamped})}$	V
$P_{TOT}$	Total power dissipation at $T_C = 25\text{ °C}$	150	W
$E_{SCIS}^{(2)}$	Single pulse energy $T_C = 25\text{ °C}$ , $L = 3\text{ mH}$ , $V_{CC} = 50\text{ V}$	300	mJ
	Single pulse energy $T_C = 150\text{ °C}$ , $L = 3\text{ mH}$ , $V_{CC} = 50\text{ V}$	180	mJ
ESD	Human body model, $R = 1.5\text{ k}\Omega$ , $C = 100\text{ pF}$	8	kV
	Machine model, $R = 0$ , $C = 100\text{ pF}$	800	V
	Charged device model	2	kV
$T_{STG}$	Storage temperature range	-55 to 175	°C
$T_J$	Operating junction temperature range		°C

1. Pulse width limited by max. junction temperature.

2. For  $E_{SCIS}$  test circuit refer to Figure 14. Test circuit for inductive load switching with A and B not connected.

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance, junction-to-case	1	°C/W
$R_{thJA}$	Thermal resistance, junction-to-ambient	62.5	°C/W

## 2 Electrical characteristics

$T_C = 25\text{ °C}$  unless otherwise specified

**Table 3. Static characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{CES(\text{clamped})}$	Collector-emitter clamped voltage	$I_C = 2\text{ mA}$ , $V_{GE} = 0\text{ V}$ , $T_J = -40\text{ °C}$ to $175\text{ °C}$	360	390	420	V
$V_{(BR)ECS}$	Emitter-collector break-down voltage	$V_{GE} = 0\text{ V}$ , $I_C = 75\text{ mA}$	20	28		V
$V_{GE(\text{clamped})}$	Gate-emitter clamped voltage	$I_G = \pm 2\text{ mA}$	12		16	V
$V_{CE(\text{sat})}$	Collector-emitter saturation voltage	$V_{GE} = 4.5\text{ V}$ , $I_C = 10\text{ A}$		1.35	1.7	V
		$V_{GE} = 4.5\text{ V}$ , $I_C = 10\text{ A}$ , $T_J = 150\text{ °C}$		1.30		V
		$V_{GE} = 3.8\text{ V}$ , $I_C = 6\text{ A}$		1.30		V
$V_{GE(\text{th})}$	Gate-threshold voltage	$V_{GE} = V_{CE}$ , $I_C = 1\text{ mA}$ , $T_J = -40\text{ °C}$	1.4			V
		$V_{GE} = V_{CE}$ , $I_C = 1\text{ mA}$	1.2	1.6	2.3	V
		$V_{GE} = V_{CE}$ , $I_C = 1\text{ mA}$ , $T_J = 150\text{ °C}$ <sup>(1)</sup>	0.7			V
$I_{CES}$	Collector cut-off current	$V_{CE} = 15\text{ V}$ , $V_{GE} = 0\text{ V}$ , $T_J = 150\text{ °C}$ <sup>(1)</sup>			10	$\mu\text{A}$
		$V_{CE} = 200\text{ V}$ , $V_{GE} = 0\text{ V}$ , $T_J = 150\text{ °C}$ <sup>(1)</sup>			100	$\mu\text{A}$
$I_{GES}$	Gate-emitter leakage current	$V_{GE} = \pm 10\text{ V}$ , $V_{CE} = 0\text{ V}$	450	625	830	$\mu\text{A}$
$R_{GE}$	Gate emitter resistance		12	16	22	k $\Omega$
$R_G$	Gate resistance			1.6		k $\Omega$

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

**Table 4. Dynamic characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{ies}$	Input capacitance	$V_{CE} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GE} = 0\text{ V}$	-	490	-	pF
$C_{oes}$	Output capacitance		-	90	-	
$C_{res}$	Reverse transfer capacitance		-	5	-	
$Q_g$	Total gate charge	$V_{CE} = 280\text{ V}$ , $I_C = 10\text{ A}$ , $V_{GE} = 0$ to $5\text{ V}$	-	29	-	nC

**Table 5. Resistive load switching characteristics**

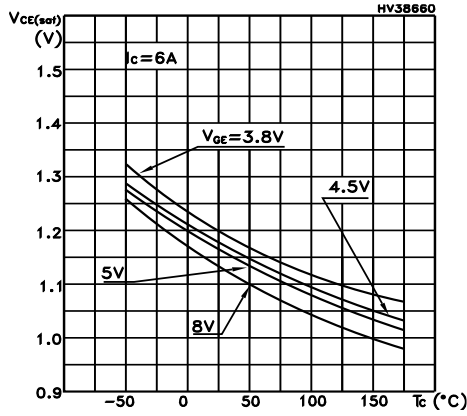
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{CC} = 14\text{ V}, V_{GE} = 5\text{ V},$ $R_L = 1\ \Omega$	-	0.65	-	$\mu\text{s}$
$t_r$	Current rise time		-	3.5	-	$\mu\text{s}$
$t_{d(on)}$	Turn-on delay time	$V_{CC} = 14\text{ V}, V_{GE} = 5\text{ V},$ $R_L = 1\ \Omega, T_J = 150\text{ }^\circ\text{C}$	-	0.65	-	$\mu\text{s}$
$t_r$	Current rise time		-	3.8	-	$\mu\text{s}$

**Table 6. Inductive load switching characteristics**

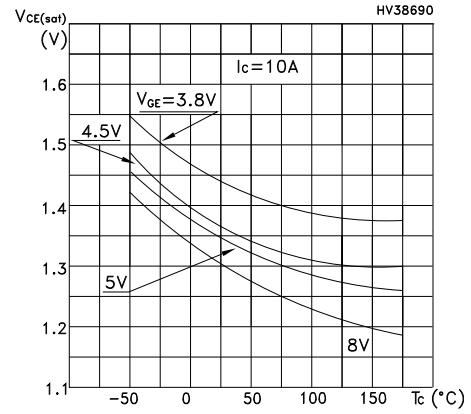
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off delay time	$V_{CC} = 300\text{ V}, L = 1\text{ mH},$ $I_C = 10\text{ A}, V_{GE} = 5\text{ V},$	-	13.5	-	$\mu\text{s}$
$t_f$	Current fall time		-	5.5	-	$\mu\text{s}$
$dV/dt$	Turn-off voltage slope		-	105	-	$\text{V}/\mu\text{s}$
$t_{d(off)}$	Turn-off delay time	$V_{CC} = 300\text{ V}, L = 1\text{ mH},$ $I_C = 10\text{ A}, V_{GE} = 5\text{ V},$ $T_J = 150\text{ }^\circ\text{C}$	-	14.2	-	$\mu\text{s}$
$t_f$	Current fall time		-	8	-	$\mu\text{s}$
$dV/dt$	Turn-off voltage slope		-	97	-	$\text{V}/\mu\text{s}$

## 2.1 Electrical characteristics (curves)

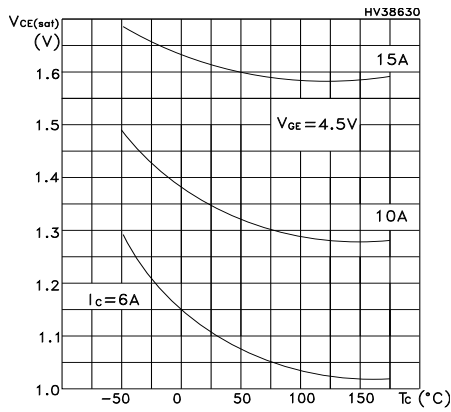
**Figure 1. Collector-emitter on voltage vs temperature**



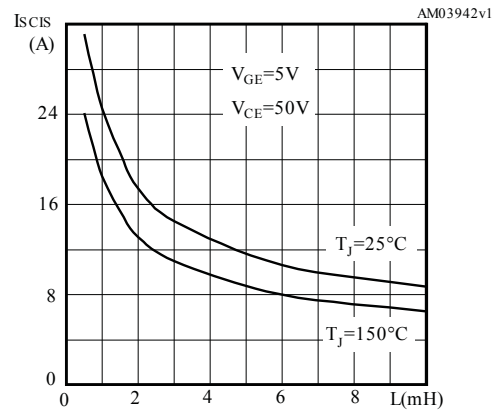
**Figure 2. Collector-emitter on voltage vs temperature**



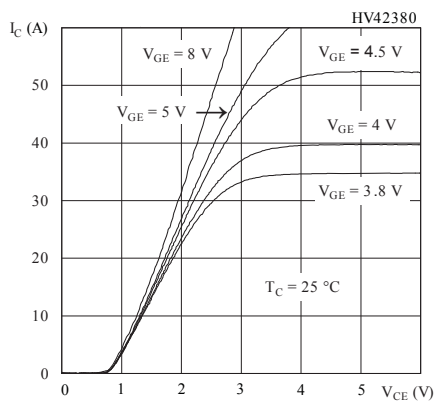
**Figure 3. Collector-emitter on voltage vs temperature**



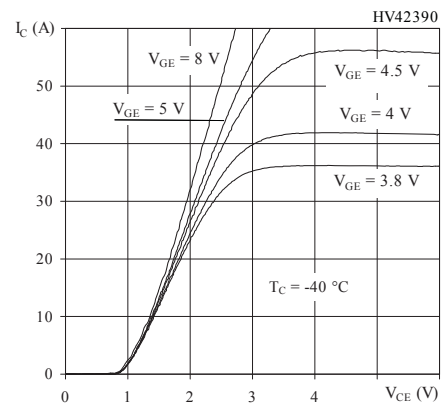
**Figure 4. Self clamped inductive switch**



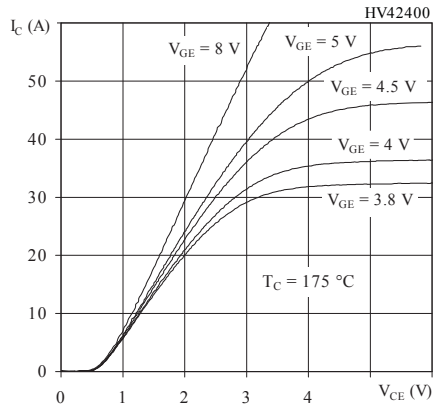
**Figure 5. Output characteristics at 25 °C**



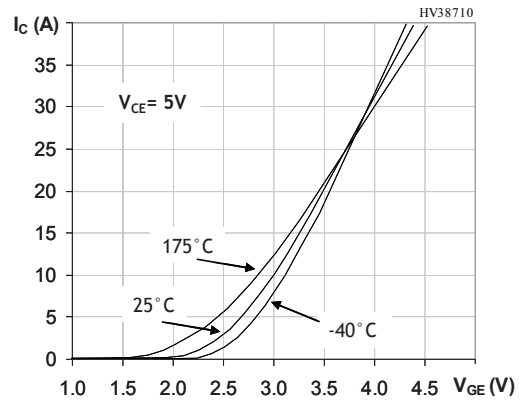
**Figure 6. Output characteristics at -40 °C**



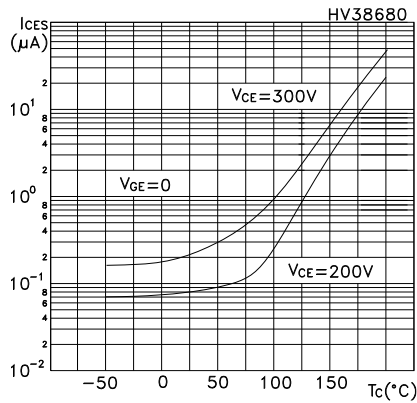
**Figure 7. Output characteristics at 175 °C**



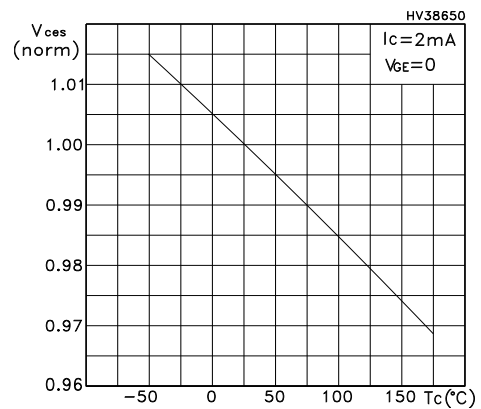
**Figure 8. Transfer characteristics**



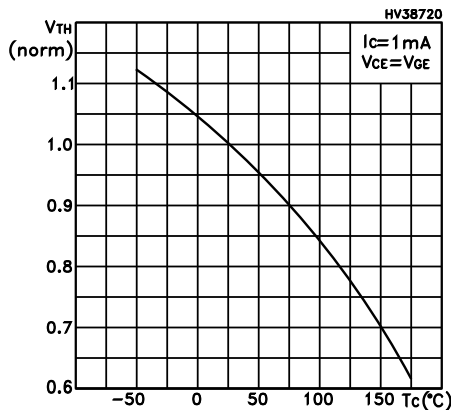
**Figure 9. Collector cut-off current vs temperature**



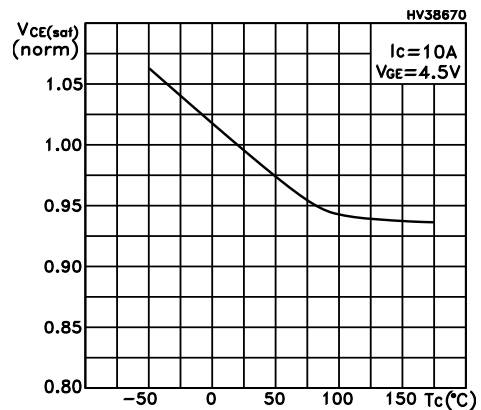
**Figure 10. Normalized collector emitter voltage vs temperature**



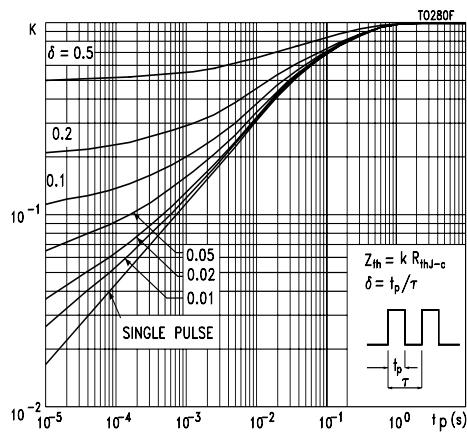
**Figure 11. Normalized gate threshold voltage vs temperature**



**Figure 12. Normalized collector emitter on voltage vs temperature**



**Figure 13. Thermal impedance**



### 3 Test circuits

Figure 14. Test circuit for inductive load switching

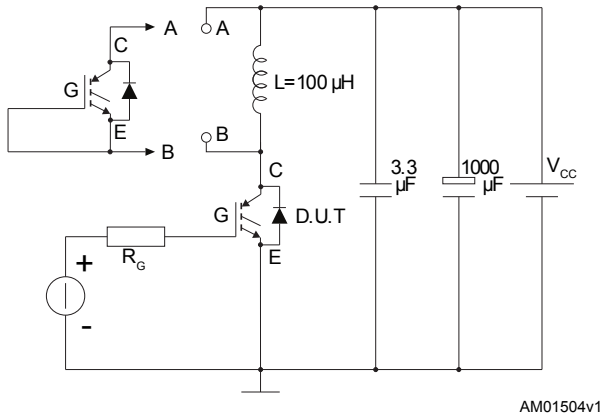


Figure 15. Test circuit for resistive load switching

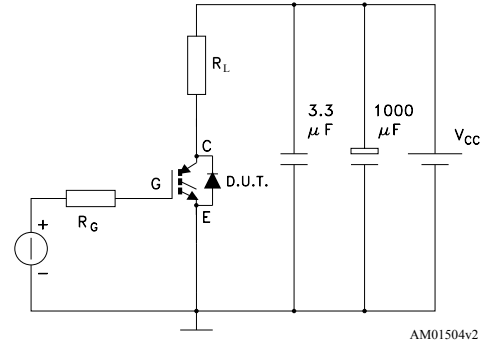


Figure 16. Gate charge test circuit

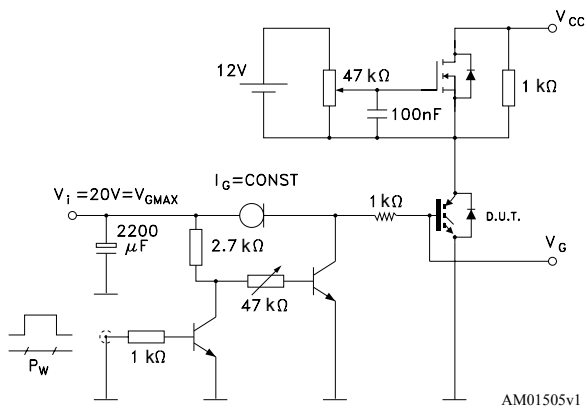
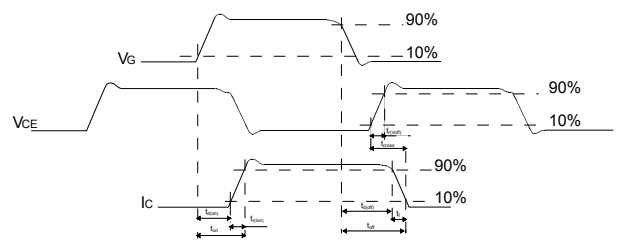


Figure 17. Switching waveform



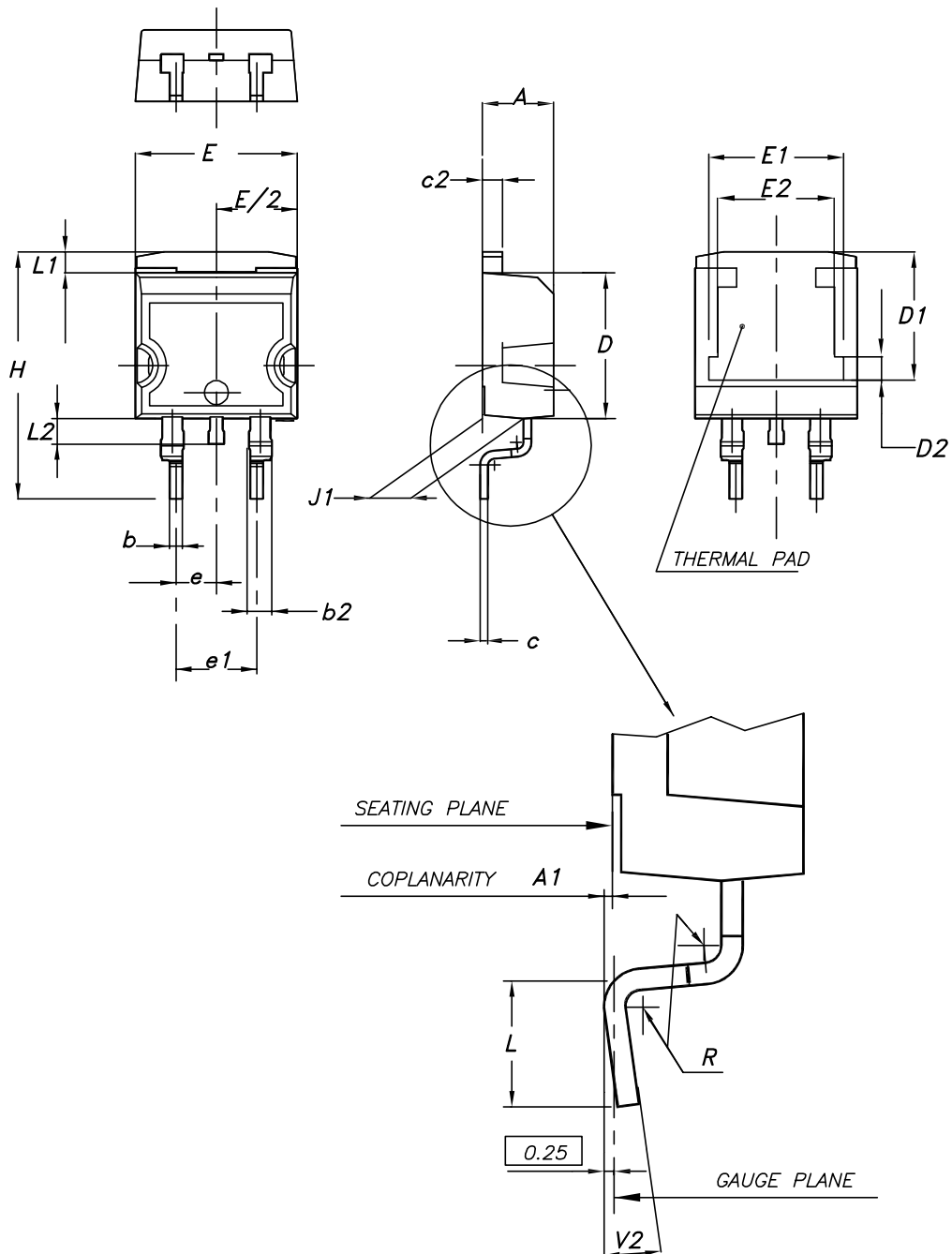


## 4 Package information

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 D<sup>2</sup>PAK (TO-263) type A package information

Figure 18. D<sup>2</sup>PAK (TO-263) type A package outline

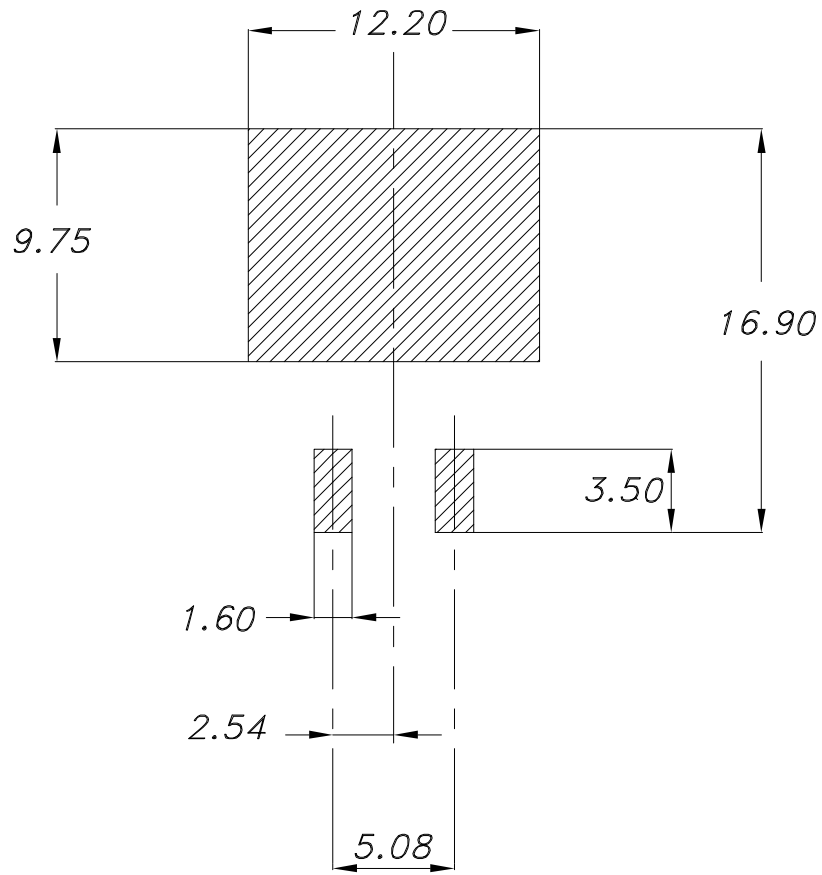


0079457\_26

**Table 7. D<sup>2</sup>PAK (TO-263) type A package 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	7.75	8.00
D2	1.10	1.30	1.50
E	10.00		10.40
E1	8.30	8.50	8.70
E2	6.85	7.05	7.25
e		2.54	
e1	4.88		5.28
H	15.00		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.40	
V2	0°		8°

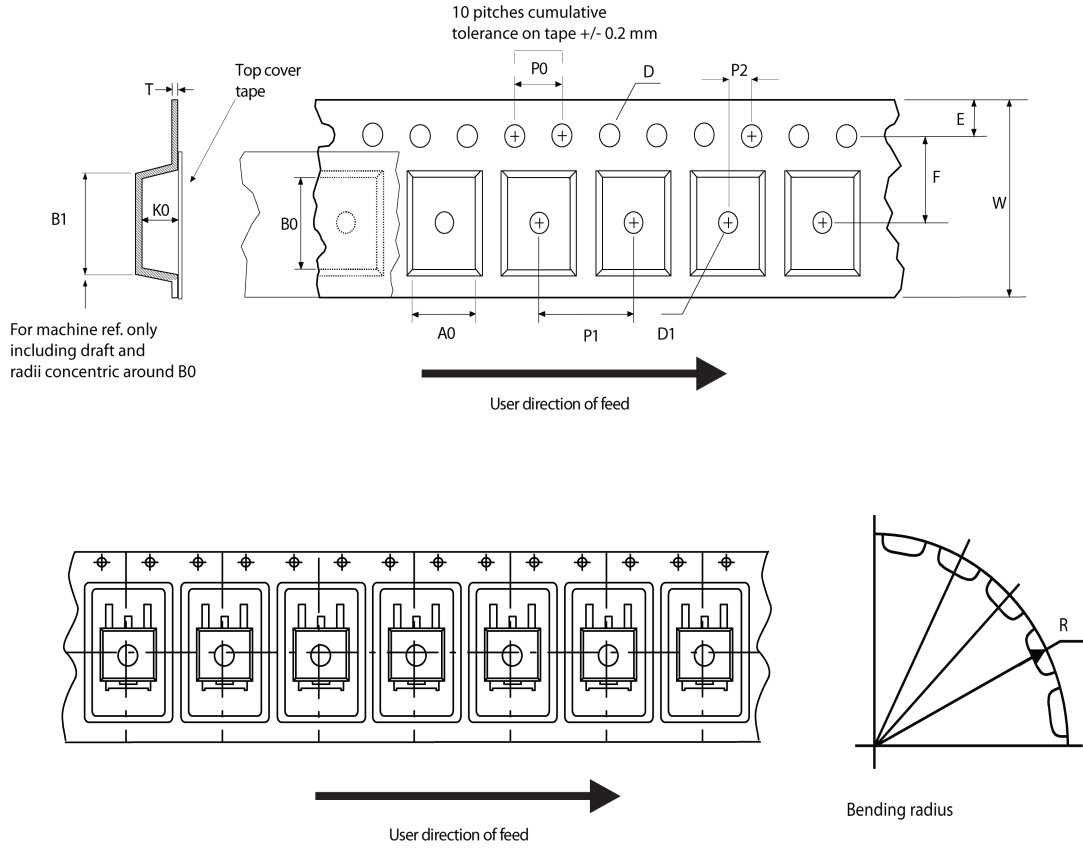
**Figure 19. D<sup>2</sup>PAK (TO-263) recommended footprint (dimensions are in mm)**



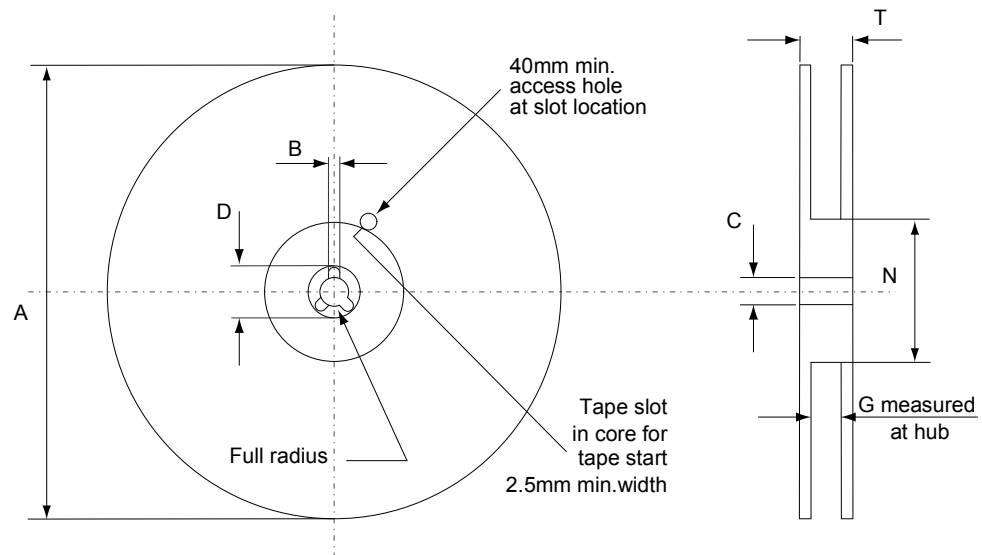
Footprint\_26

## 4.2 D<sup>2</sup>PAK packing information

Figure 20. D<sup>2</sup>PAK tape outline



AM08852v1

**Figure 21. D<sup>2</sup>PAK reel outline**


AM06038v1

**Table 8. D<sup>2</sup>PAK tape and reel mechanical data**

Dim.	Tape		Dim.	Reel	
	mm			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 quantity		1000
P2	1.9	2.1	Bulk quantity		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

## Revision history

**Table 9. Document revision history**

Date	Revision	Changes
18-Jan-2008	1	Initial release.
07-Mar-2008	2	Modified <i>Figure 7</i> , <i>Figure 8</i> , <i>Figure 10</i> .
07-May-2008	3	Modified <i>Figure 9</i>
31-Mar-2009	4	Added new package, mechanical data: TO-220
18-May-2009	5	Modified <i>Figure 5</i>
12-Nov-2014	6	Updated <i>Table 1: Device summary</i> , <i>Table 2: Absolute maximum ratings</i> and <i>Table 3: Thermal data</i> Updated <i>3: Test circuits</i> Updated <i>Section 4: Package mechanical data</i> Updated <i>Section 5: Packaging mechanical data</i> Minor text changes
11-Jan-2021	7	The part numbers STGD18N40LZ and STGP18N40LZT4 have been removed. Minor text changes

---

## Contents

<b>1</b>	<b>Electrical ratings</b> .....	<b>2</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>3</b>
<b>2.1</b>	<b>Electrical characteristics (curves)</b> .....	<b>5</b>
<b>3</b>	<b>Test circuits</b> .....	<b>8</b>
<b>4</b>	<b>Package information</b> .....	<b>9</b>
<b>4.1</b>	<b>D<sup>2</sup>PAK (TO-263) type A package information</b> .....	<b>9</b>
<b>4.2</b>	<b>D<sup>2</sup>PAK packing information</b> .....	<b>12</b>
	<b>Revision history</b> .....	<b>14</b>

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2021 STMicroelectronics – All rights reserved



单击下面可查看定价，库存，交付和生命周期等信息

[>>STMicro\(意法半导体\)](#)