



STV300NH02L

N-channel 24 V, 0.8 mΩ typ., 200 A STripFET™ III Power MOSFET in a PowerSO-10 package

Datasheet — production data

Features

Order code	V _{DSS}	R _{DS(on)} max	I _D
STV300NH02L	24 V	0.001 Ω	200 A ⁽¹⁾

1. This value is limited by package

- R_{DS(on)}*Q_g industry's benchmark
- Conduction losses reduced
- Low profile, very low parasitic inductance
- Switching losses reduced

Applications

- Switching applications
 - OR-ing
- Specially designed and optimized for high efficiency DC/DC converters.

Description

This N-channel enhancement mode Power MOSFET benefits from the latest refinement of STMicroelectronics' unique "single feature size" strip-based process, which decreases the critical alignment steps to offer exceptional manufacturing reproducibility. The result is a transistor with extremely high packing density for low on-resistance, rugged avalanche characteristics and low gate charge.

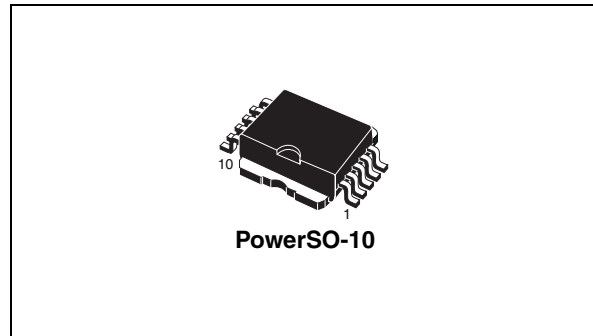


Figure 1. Internal schematic diagram

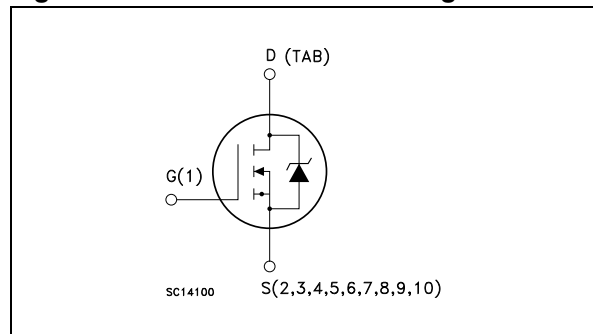


Figure 2. Connection diagram (top view)

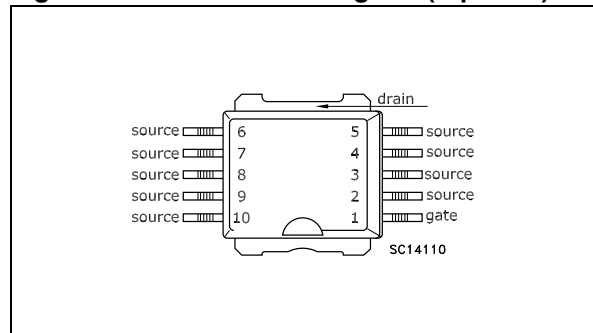


Table 1. Device summary

Order code	Marking	Package	Packaging
STV300NH02L	300NH02L	PowerSO-10	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	24	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	200	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	200	A
$I_{DM}^{(2)}$	Drain current (pulsed)	800	A
$P_{TOT}^{(3)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2	W/ $^\circ\text{C}$
$E_{AS}^{(4)}$	Single pulse avalanche energy	1.6	J
T_{stg}	Storage temperature	-55 to 175	$^\circ\text{C}$
T_j	Operating junction temperature		

1. This value is limited by package
2. Pulse with limited by safe operating area
3. This value is rated according to R_{thj-c}
4. Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = 60\text{ A}$, $V_{DD} = 20\text{ V}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.5	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	35	$^\circ\text{C}/\text{W}$

1. When mounted on 1 inch² FR-4, 2 oz Cu

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 (V _{GS} = 0)	I _D = 1 mA	24			V
I _{DSS}	Zero gate voltage drain current (V _{GS} = 0)	V _{DS} = 24 V V _{DS} = 24 V, T _c = 125 °C			1 10	μA μA
I _{GSS}	Gate body leakage current (V _{DS} = 0)	V _{DS} = ± 20 V			±100	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	1	1.5	2.5	V
R _{DS(on)}	Static drain-source on-resistance	V _{GS} = 5 V, I _D = 40 A V _{GS} = 10 V, I _D = 80 A		1.15 0.8	1.5 1	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input capacitance	V _{DS} = 15V, f = 1 MHz, V _{GS} = 0	-	7055	-	pF
C _{oss}	Output capacitance			3251		pF
C _{rss}	Reverse transfer capacitance			307		pF
Q _g	Total gate charge	V _{DD} = 12V, I _D = 120A,	-	109	-	nC
Q _{gs}	Gate-source charge	V _{GS} = 10V		30		nC
Q _{gd}	Gate-drain charge	(see Figure 15)		26		nC
R _G	Gate input resistance	V _{DS} = 0V, f = 1 MHz, V _{GS} = 0	-	4.4	-	Ω

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 12V, I _D = 60A R _G = 4.7Ω, V _{GS} = 10V, (see Figure 14)	-	18	-	ns
t _r	Rise time			275		ns
t _{d(off)}	Turn-off delay time	V _{DD} = 12V, I _D = 60A R _G = 4.7Ω, V _{GS} = 10V, (see Figure 14)	-	138	-	ns
t _f	Fall time			94.4		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		200	A
I_{SDM}	Source-drain current (pulsed)				800	A
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 120A, V_{GS} = 0$	-		1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 120A, di/dt = 100A/\mu s$		63		ns
Q_{rr}	Reverse recovery charge	$V_{DD} = 20V, T_j = 25^\circ C$	-	85		nC
I_{RRM}	Reverse recovery current	(see Figure 19)		2.7		A
t_{rr}	Reverse recovery time	$I_{SD} = 120A, di/dt = 100A/\mu s$		63		ns
Q_{rr}	Reverse recovery charge	$V_{DD} = 20V, T_j = 150^\circ C$	-	88		nC
I_{RRM}	Reverse recovery current	(see Figure 19)		2.8		A

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

2.1 Electrical characteristics (curves)

Figure 3. Safe operating area

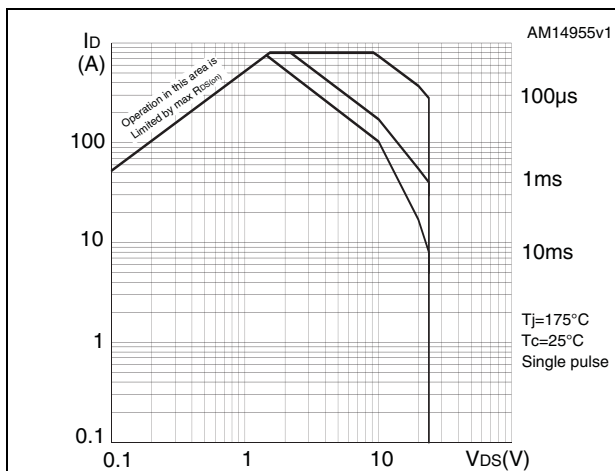


Figure 4. Thermal impedance

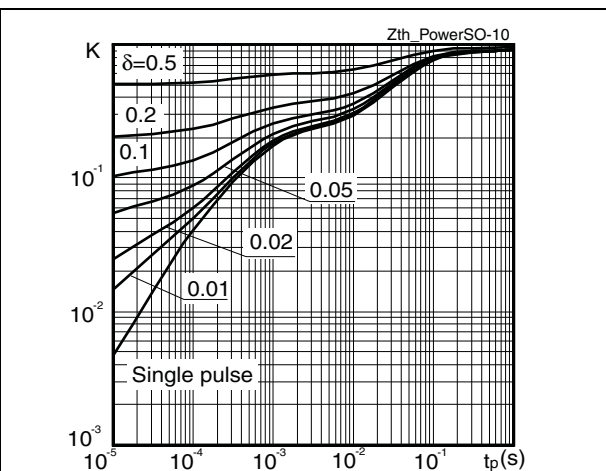


Figure 5. Output characteristics

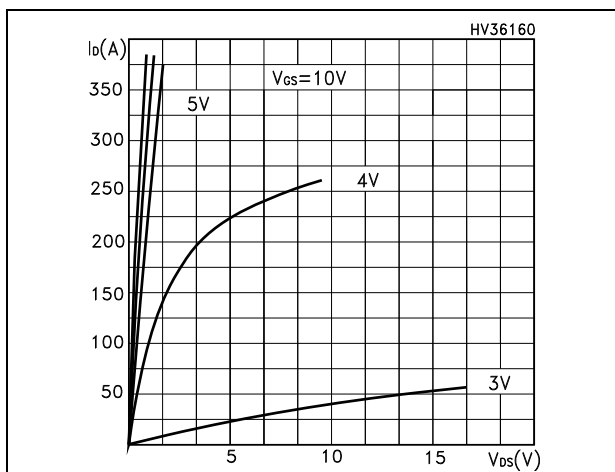


Figure 6. Transfer characteristics

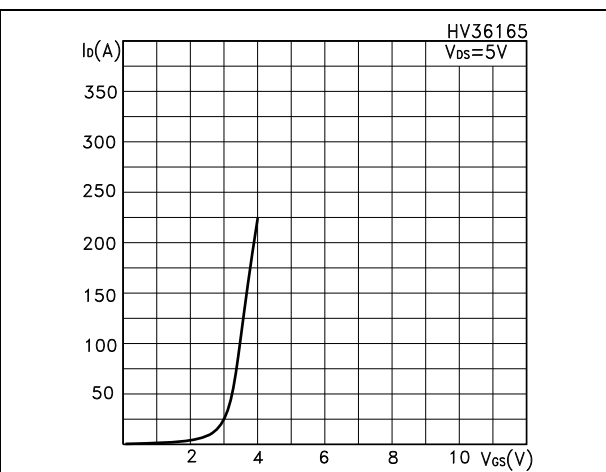


Figure 7. Static drain-source on-resistance

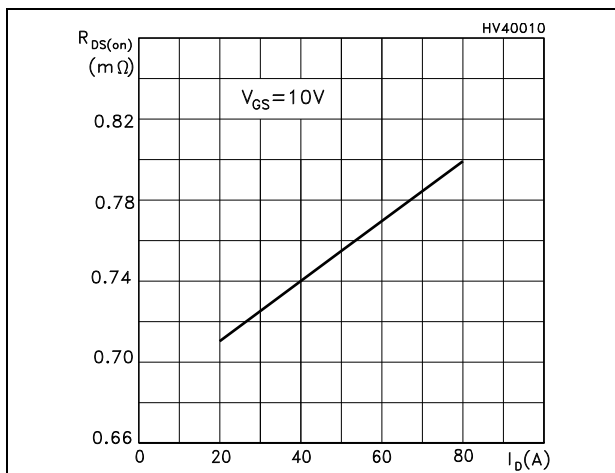


Figure 8. Normalized BV_{DSS} vs temperature

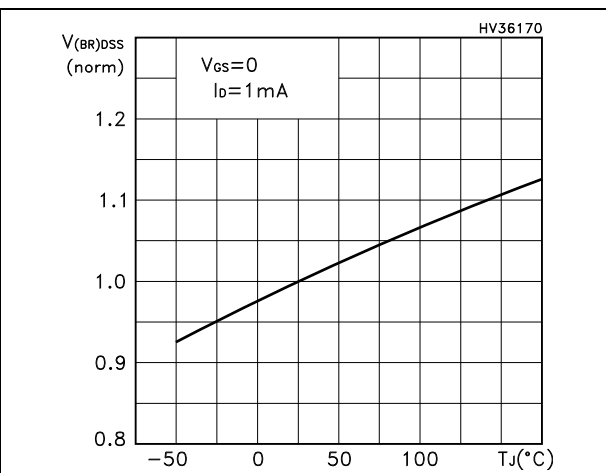


Figure 9. Gate charge vs gate-source voltage Figure 10. Capacitance variations

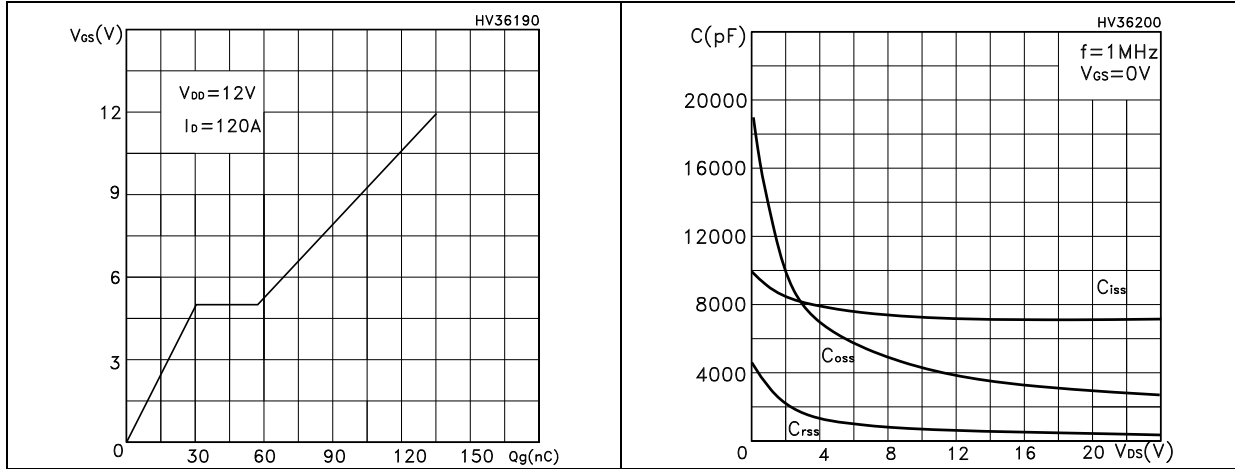


Figure 11. Normalized gate threshold voltage vs temperature Figure 12. Normalized on-resistance vs temperature

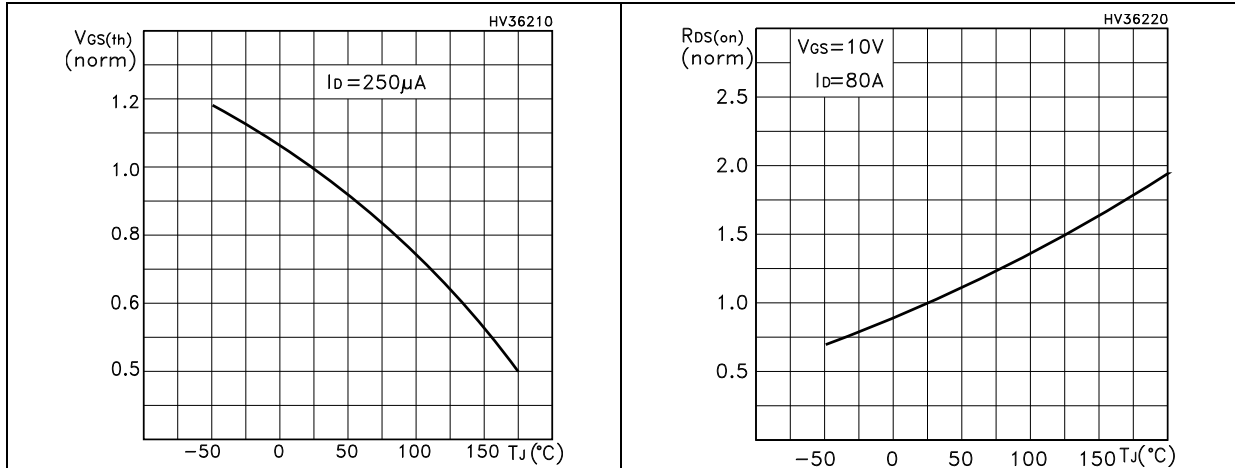
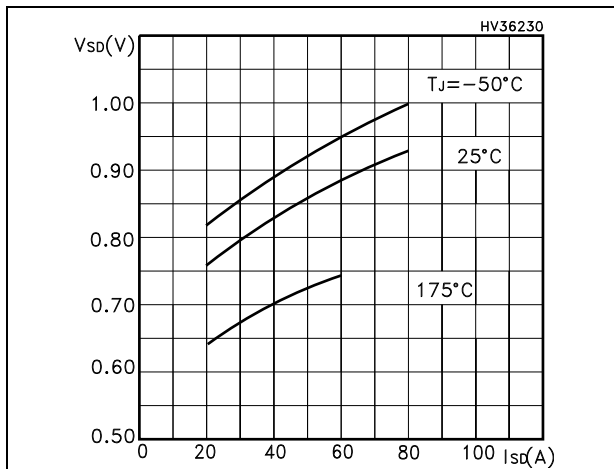
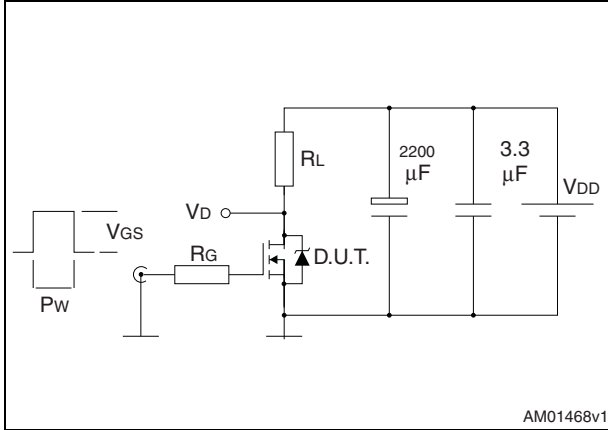


Figure 13. Source-drain diode forward characteristics



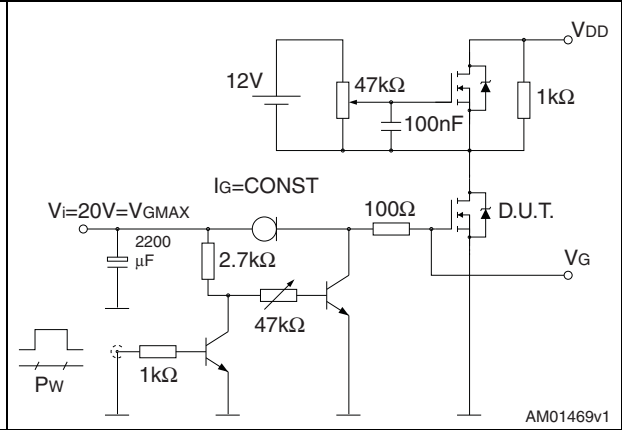
3 Test circuits

Figure 14. Switching times test circuit for resistive load



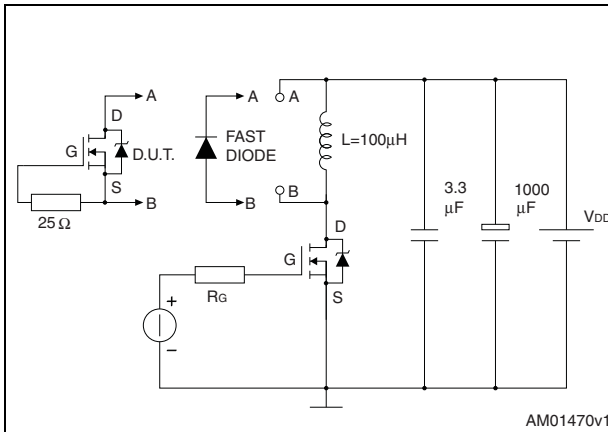
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Figure 15. Gate charge test circuit



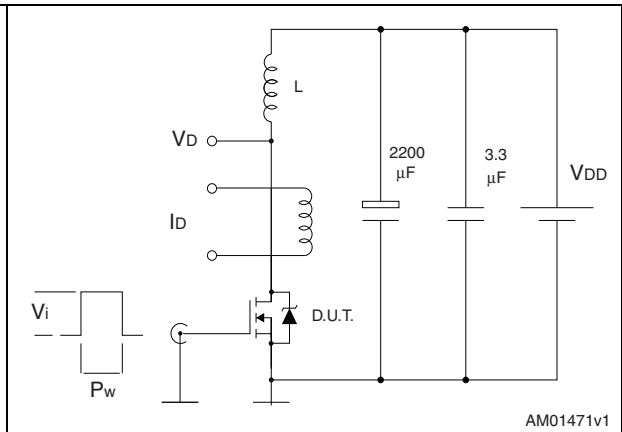
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Figure 16. Test circuit for inductive load switching and diode recovery times



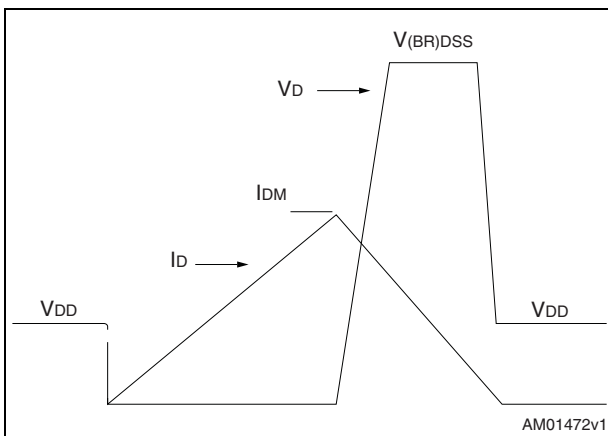
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Figure 17. Unclamped inductive load test circuit



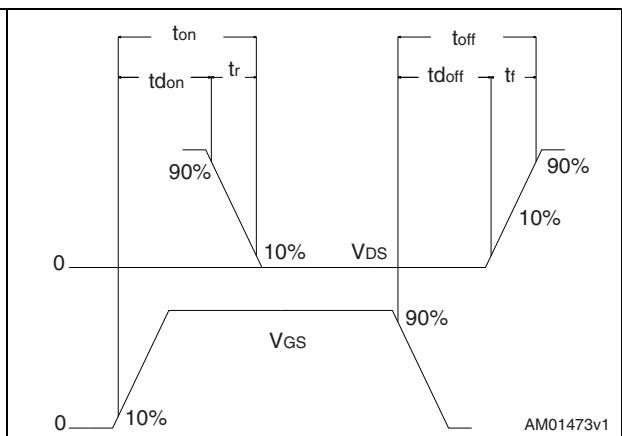
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Figure 18. Unclamped inductive waveform



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Figure 19. Switching time waveform



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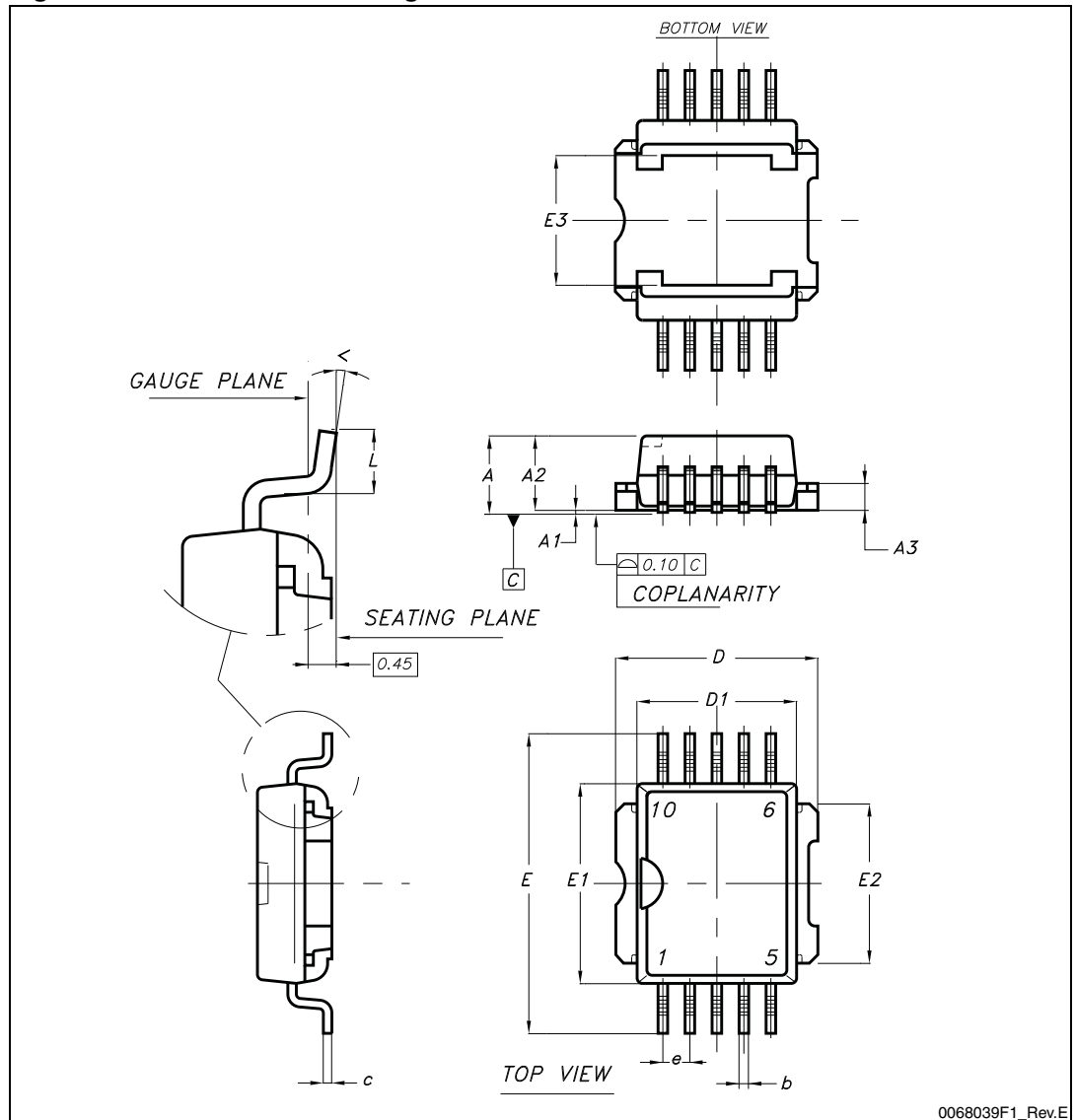
4 Package mechanical data

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 8. PowerSO-10 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			3.70
A1	0.00		0.10
A2	3.40		3.60
A3	1.25		1.35
b	0.40		0.53
c	0.35		0.55
D	9.40		9.60
D1	7.40		7.60
E	13.80		14.40
E1	9.30		9.50
E2	7.20		7.60
E3	5.90		6.10
e		1.27	
L	0.95		1.65
<	0°		8°

Figure 20. PowerSO-10 drawing



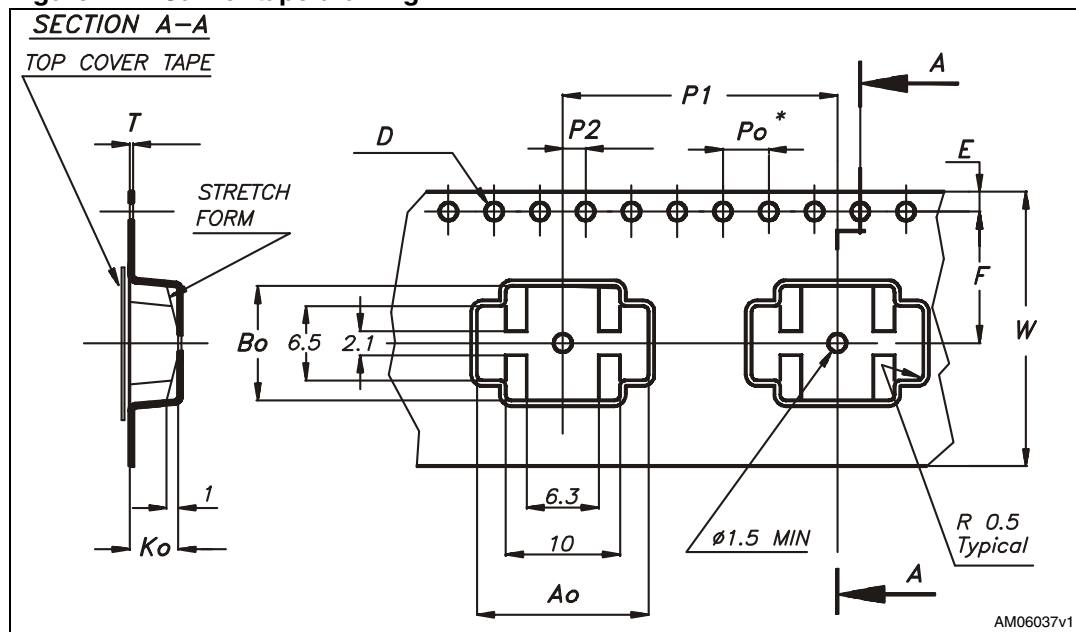
5 Packaging mechanical data

Table 9. Carrier tape dimensions

Ref.	mm		
	Min.	Typ.	Max.
A0	14.9	15.0	15.1
B0	9.9	10.0	10.1
K0	4.15	4.25	4.35
F	11.4	11.5	11.6
E	1.65	1.75	1.85
W	23.7	24.0	24.3
P2	1.9	2.0	2.1
P0	3.9	4.0	4.1
P1	23.9	24.0	24.1
T	0.025	0.30	0.35
D(Ø)	1.50	1.55	1.60

Note: 10 sprocket hole pitch cumulative tolerance ± 0.2 mm.

Figure 21. Carrier tape drawing (a)



a. Drawing is not to scale.

Table 10. Reel dimensions

Ref.	mm		
	Min.	Typ.	Max.
A			330
B	1.5		
C	12.8	13	13.2
D	20.2		
N	60		
G		24.4	
T			30.4

Note: 10 sprocket hole pitch cumulative tolerance ± 0.2 mm.

Figure 22. Reel drawing (b)

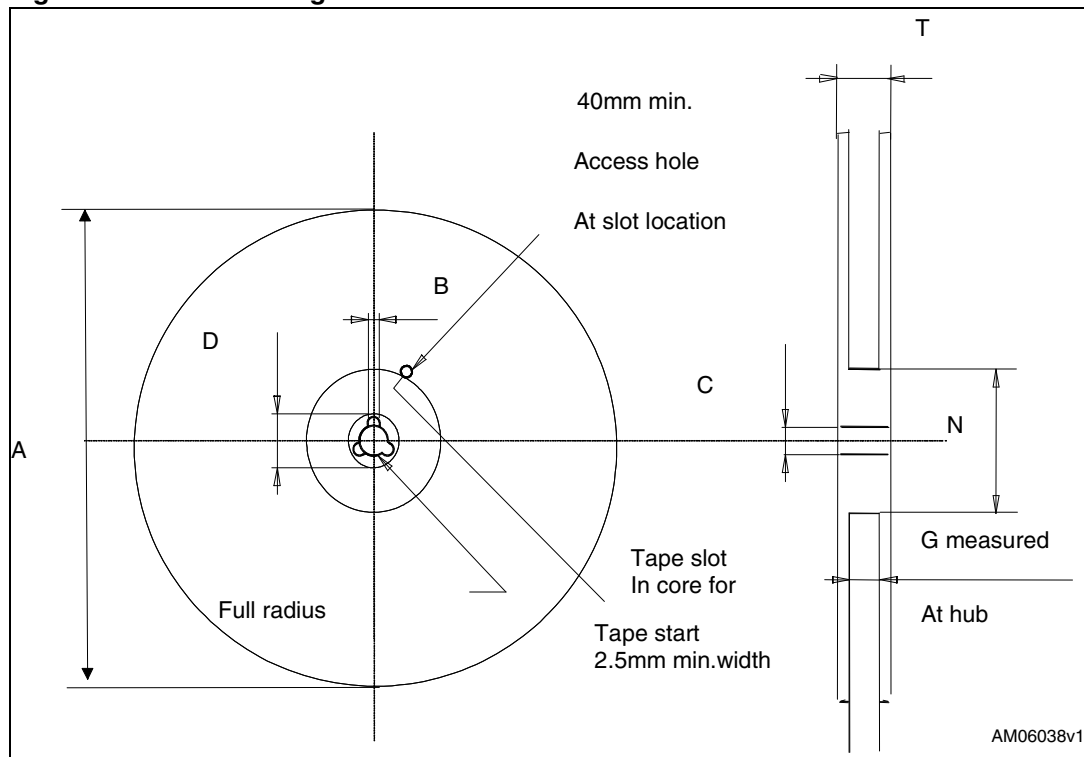


Table 11. Base/bulk quantities

Base qty.	Bulk qty.
	600

b. Drawing is not to scale.

6 Revision history

Table 12. Revision history

Date	Revision	Changes
08-Feb-2007	1	First release
13-Sep-2007	2	New section has been added: 2.1: Electrical characteristics (curves) .
10-Oct-2012	3	Updated Table 4: On /off states and Section 4: Package mechanical data . Inserted Section 5: Packaging mechanical data . Minor text changes.

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