



# STV240N75F3

N-channel 75 V, 2.3 mΩ, 240 A PowerSO-10  
STripFET™ III Power MOSFET

## Features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STV240N75F3	75 V	< 2.6 mΩ	240 A

- Conduction losses reduced
- Low profile, very low parasitic inductance

## Application

- Switching applications

## Description

This STripFET™ III Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance providing superior switching performances.

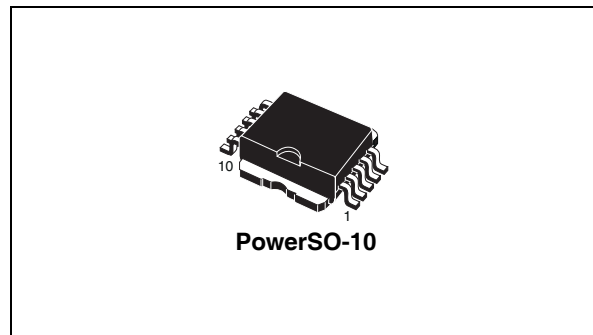


Figure 1. Internal schematic diagram and connection diagram (top view)

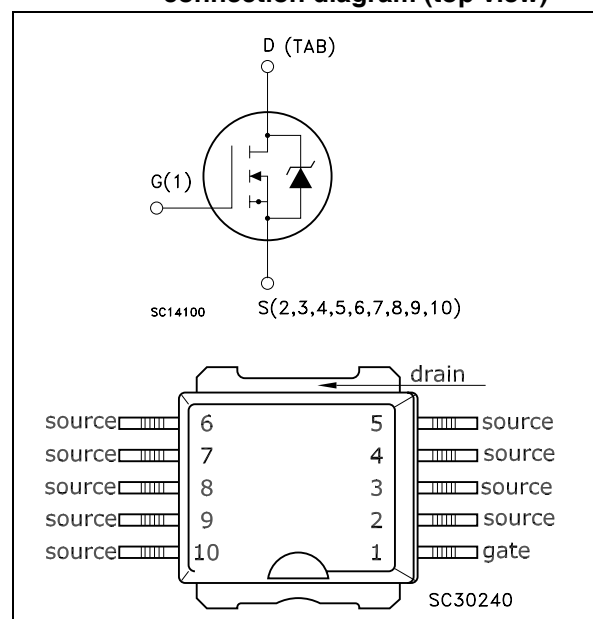


Table 1. Device summary

Order code	Marking	Package	Packaging
STV240N75F3	240N75F3	PowerSO-10	Tape and reel

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0$ )	75	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	240	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	170	A
$I_{DM}^{(1)}$	Drain current (pulsed)	960	A
$P_{TOT}^{(2)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2.0	W/ $^\circ\text{C}$
$E_{AS}^{(3)}$	Single pulse avalanche energy	600	mJ
$T_{stg}$	Storage temperature	-55 to 175	$^\circ\text{C}$
$T_j$	Operating junction temperature		$^\circ\text{C}$

1. Pulse width limited by safe operating area
2. This value is rated according to  $R_{thj-c}$
3. Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 60\text{ A}$ ,  $V_{DD} = 15\text{ V}$

**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 inch<sup>2</sup> FR-4 2 oz Cu.

## 2 Electrical characteristics

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

**Table 4. On /off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$ , $V_{GS} = 0$	75			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max rating}$ , $V_{DS} = \text{Max rating}$ , $T_C = 125\text{ °C}$			10 100	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate body leakage current ( $V_{DS} = 0$ )	$V_{DS} = \pm 20\text{ V}$			$\pm 200$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$ , $I_D = 120\text{ A}$		2.3	2.6	$\text{m}\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$	-	6800	-	pF
$C_{oss}$	Output capacitance			1100		
$C_{rss}$	Reverse transfer capacitance			50		
$Q_g$	Total gate charge	$V_{DD} = 37.5\text{ V}$ , $I_D = 120\text{ A}$ ,	-	85	-	nC
$Q_{gs}$	Gate-source charge	$V_{GS} = 10\text{ V}$		30		
$Q_{gd}$	Gate-drain charge	(see <a href="#">Figure 14</a> )		26		

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$t_{d(on)}$ $t_r$	Turn-on delay time Rise time	$V_{DD} = 37.5\text{ V}$ , $I_D = 60\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ , (see <a href="#">Figure 13</a> )	-	25 70	-	ns ns
$t_{d(off)}$ $t_f$	Turn-off delay time Fall time	$V_{DD} = 37.5\text{ V}$ , $I_D = 60\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ , (see <a href="#">Figure 13</a> )	-	100 15	-	ns ns

**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SD}^{(1)}$	Source-drain current Source-drain current (pulsed)		-		240 960	A A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 120\text{ A}$ , $V_{GS} = 0$	-		1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 120\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ , $T_j = 150\text{ }^\circ\text{C}$ (see <a href="#">Figure 18</a> )	-	80 180 4.5		ns nC A

1. Pulse width limited by safe operating area
2. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

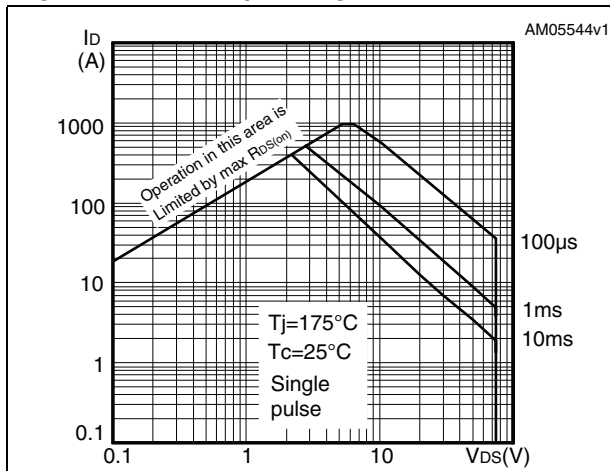


Figure 3. Thermal impedance

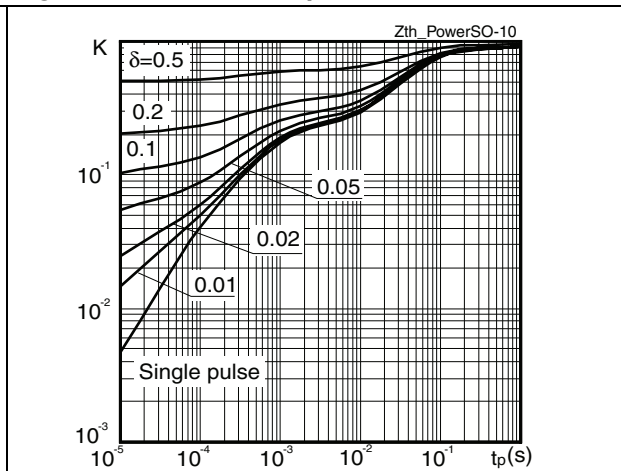


Figure 4. Output characteristics

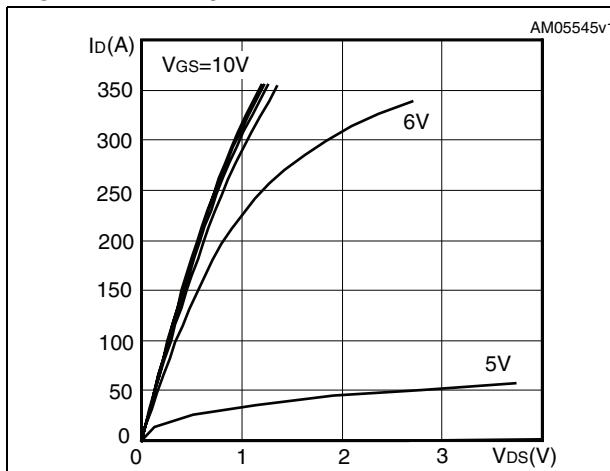


Figure 5. Transfer characteristics

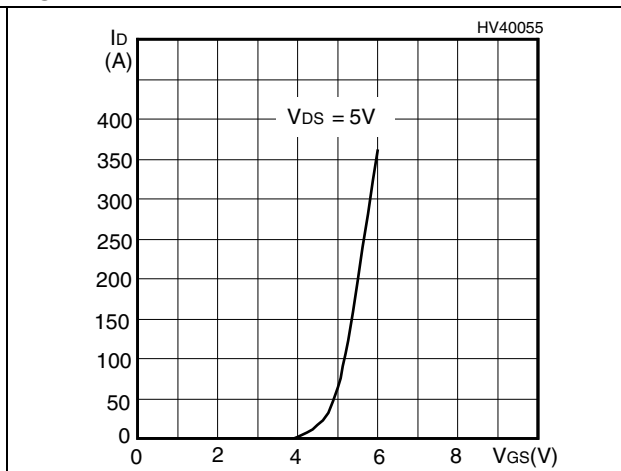


Figure 6. Normalized  $BV_{DSS}$  vs temperature

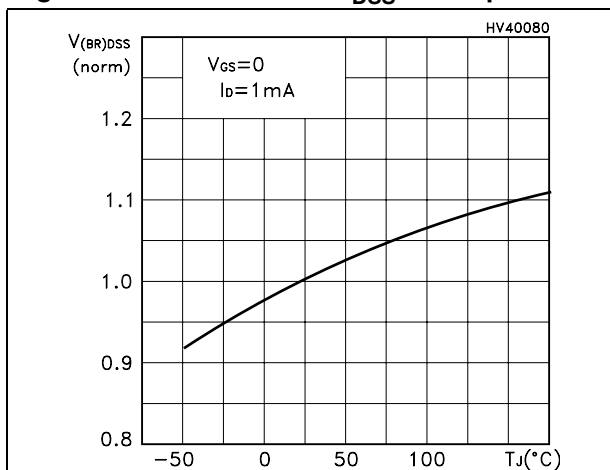


Figure 7. Static drain-source on resistance

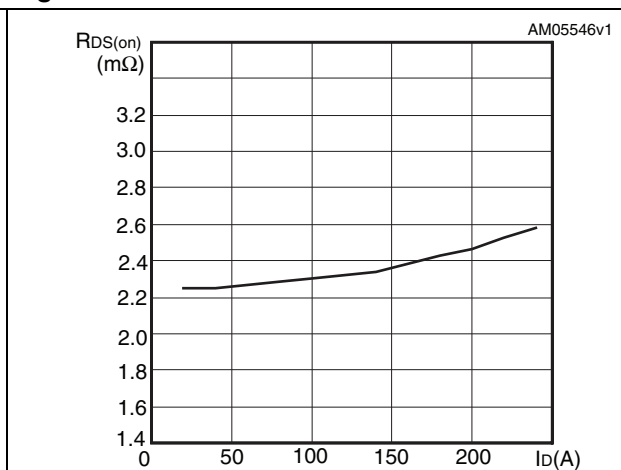


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

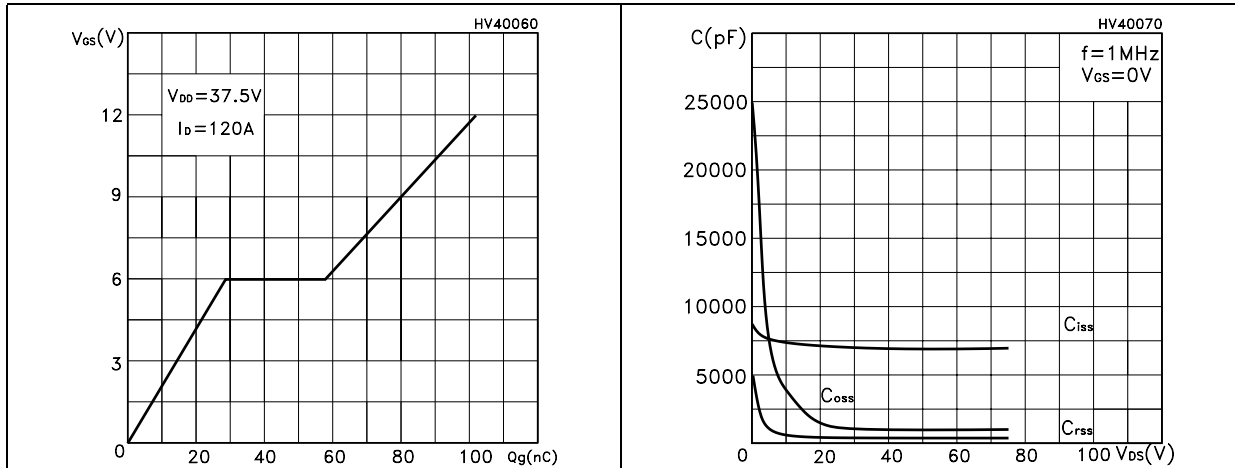


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

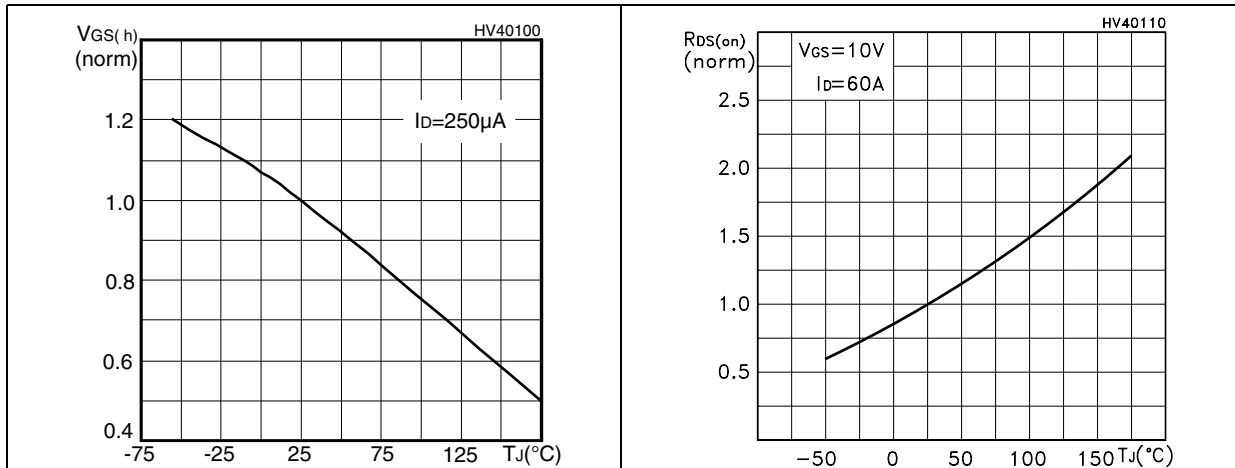
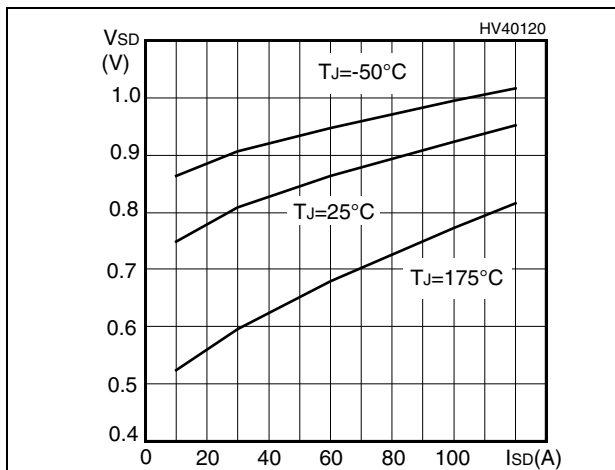
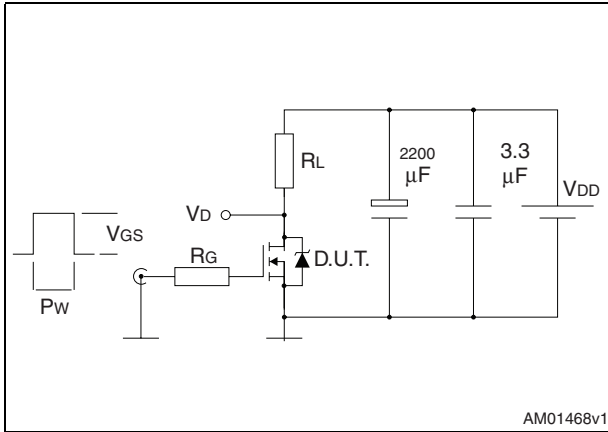


Figure 12. Source-drain diode forward characteristics

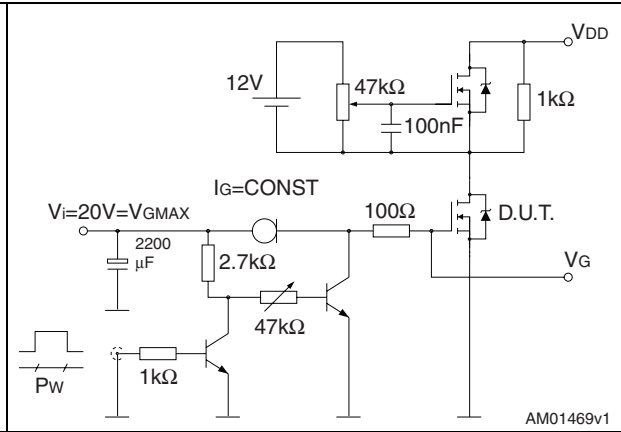


### 3 Test circuits

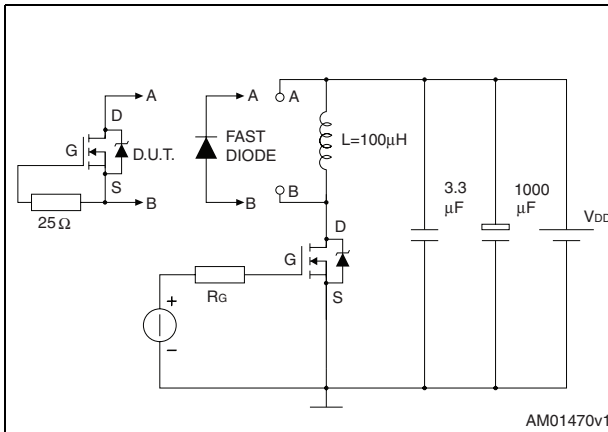
**Figure 13. Switching times test circuit for resistive load**



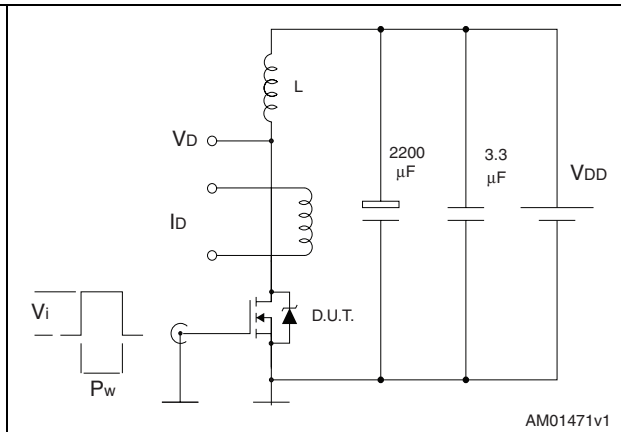
**Figure 14. Gate charge test circuit**



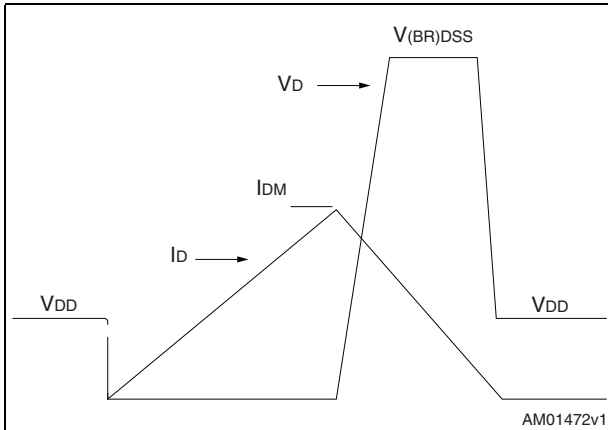
**Figure 15. Test circuit for inductive load switching and diode recovery times**



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



**Figure 17. Unclamped inductive waveform**



**Figure 18. Switching time waveform**

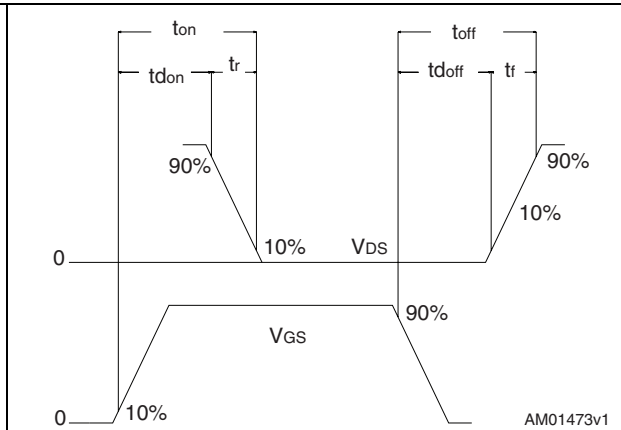




Figure 19. Gate charge test waveform

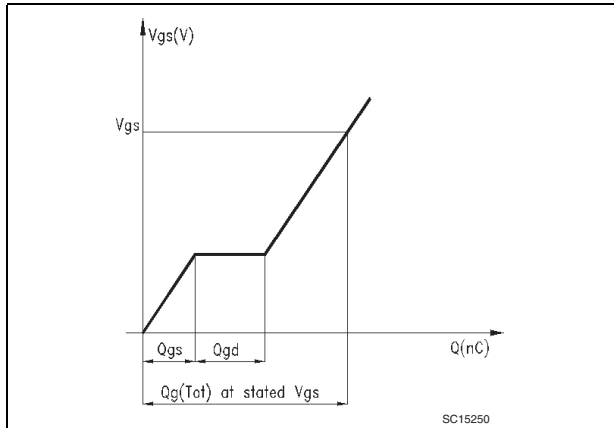
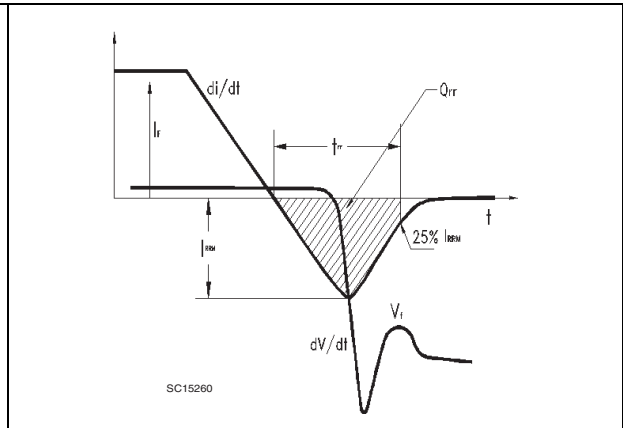


Figure 20. Diode recovery times waveform

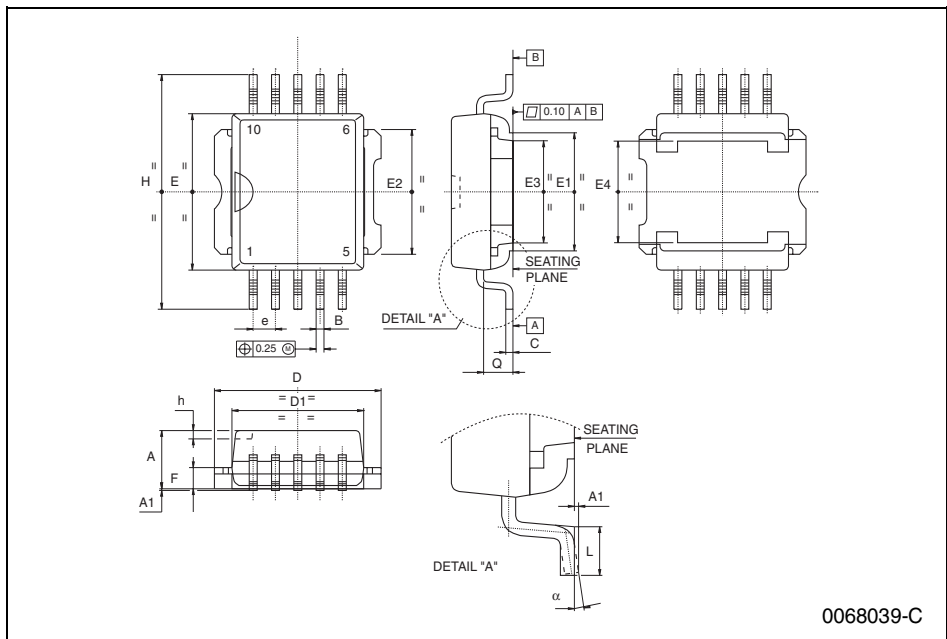


## 4 Package mechanical data

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

**PowerSO-10 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.35		3.65	0.132		0.144
A1	0.00		0.10	0.000		0.004
B	0.40		0.60	0.016		0.024
C	0.35		0.55	0.013		0.022
D	9.40		9.60	0.370		0.378
D1	7.40		7.60	0.291		0.300
e		1.27			0.050	
E	9.30		9.50	0.366		0.374
E1	7.20		7.40	0.283		0.291
E2	7.20		7.60	0.283		0.300
E3	6.10		6.35	0.240		0.250
E4	5.90		6.10	0.232		0.240
F	1.25		1.35	0.049		0.053
h		0.50			0.002	
H	13.80		14.40	0.543		0.567
L	1.20		1.80	0.047		0.071
q		1.70			0.067	
$\alpha$	0°		8°			



## 5 Packaging information

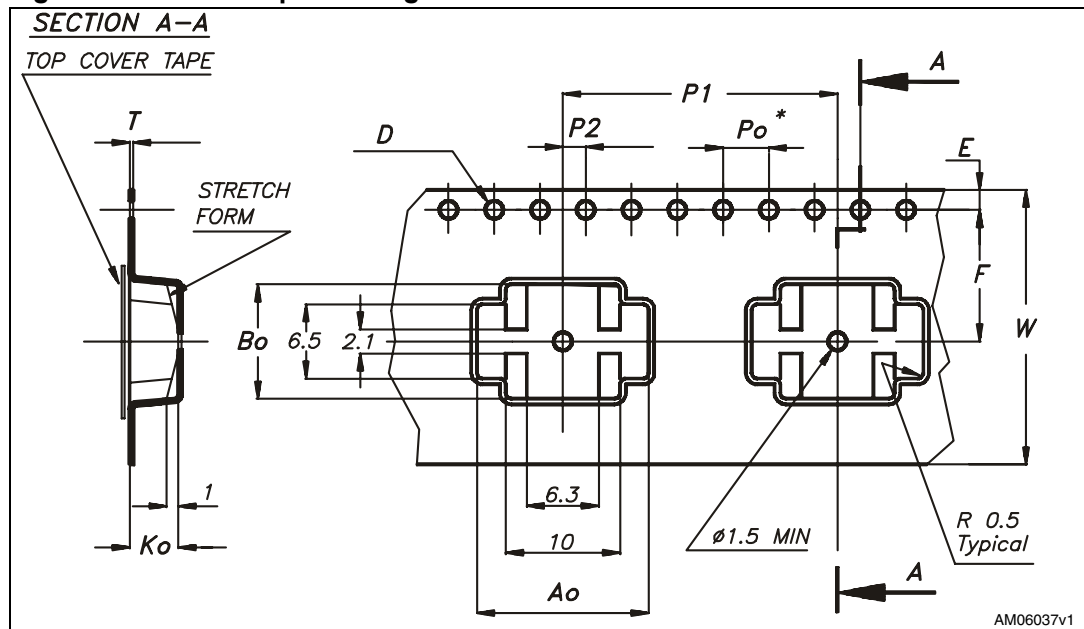
### 5.1 Tape and reel for PowerSO-10

Table 8. 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  $\pm 0.2$  mm.

Figure 21. Carrier tape drawing (a)

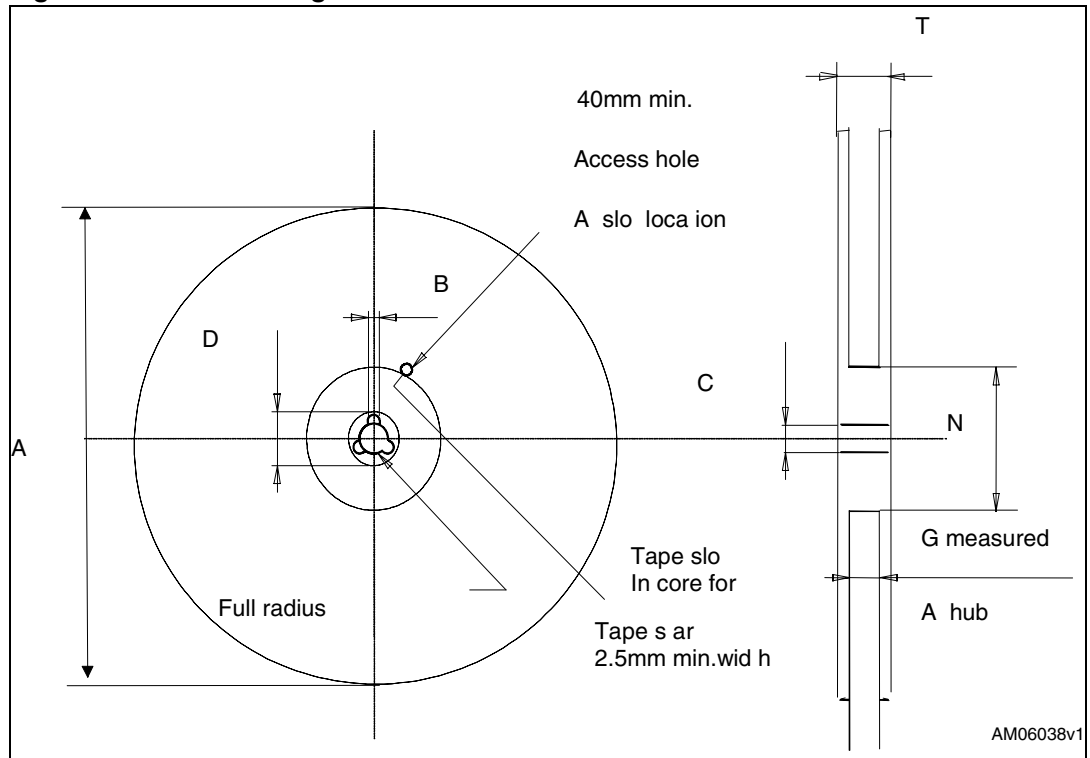


**Table 9. Reel dimensions**

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  $\pm 0.2$  mm.

**Figure 22. Reel drawing (b)**



**Table 10. Base and bulk quantities**

Base qty.	Bulk qty.
	600

- a. Drawing is not to scale.
- b. Drawing is not to scale.

## 6 Revision history

**Table 11. Document revision history**

Date	Revision	Changes
02-Apr-2008	1	Initial release
21-Jan-2010	2	– Document status promoted from preliminary data to datasheet. – Inserted new <a href="#">Section 5: Packaging information</a> .

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