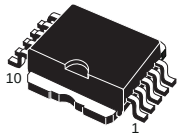
STV240N75F3

N-channel 75 V, 3 mΩ typ., 200 A STripFET™ F3 Power MOSFET in a PowerSO-10 package

Datasheet - production data



PowerSO-10

Figure 1. Internal schematic diagram

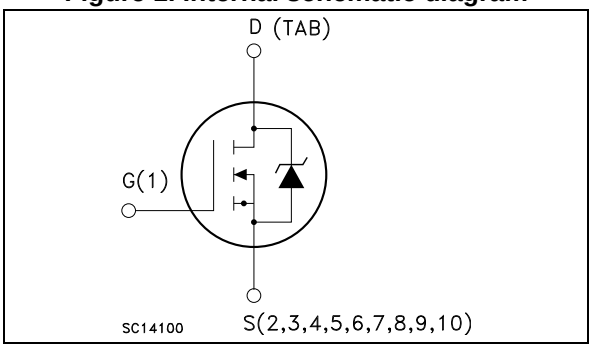
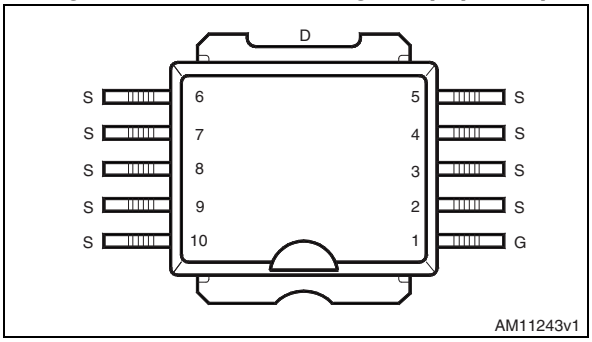


Figure 2. Connection diagram (top view)



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D
STV240N75F3	75 V	3.3 mΩ	200 A

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

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using STripFET™ F3 technology. It is designed to minimize on-resistance and gate charge to provide superior switching performance.

Table 1. Device summary

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

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	75	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	200	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	170	A
I_{DM} (2)	Drain current (pulsed)	800	A
P_{TOT}	Total dissipation at T_C = 25 °C	300	W
	Derating factor	2.0	W/°C
E_{AS} (3)	Single pulse avalanche energy	600	mJ
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Operating junction temperature		°C

1. Current limited by package
2. Pulse width limited by safe operating area
3. Starting Tj = 25 °C, I_D = 60 A, V_{DD} = 15 V

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case max	0.5	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb max	35	°C/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	I_D = 1 mA, V_{GS}= 0	75			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 75 V, V_{DS} = 75 V, T_C = 125 °C			10 100	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ± 20 V			±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	2		4	V
$R_{DS(on)}$	Static drain-source on- resistance	V_{GS}= 10 V, I_D= 120 A		3	3.3	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 25 V, f = 1 MHz, V_{GS} =0	-	6800	-	pF
C_{oss}	Output capacitance		-	1100	-	pF
C_{rss}	Reverse transfer capacitance		-	50	-	pF
Q_g	Total gate charge	V_{DD}= 37.5 V, I_D= 120 A, V_{GS}= 10 V *(see Figure 15)*	-	85	-	nC
Q_{gs}	Gate-source charge		-	30	-	nC
Q_{gd}	Gate-drain charge		-	26	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 37.5 V, I_D = 60 A R_G= 4.7 Ω, V_{GS}= 10 V, *(see Figure 14 and Figure 19)*	-	25	-	ns
t_r	Rise time		-	70	-	ns
$t_{d(off)}$	Turn-off delay time		-	100	-	ns
t_f	Fall time		-	15	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} (1)	Source-drain current		-		200	A
I_{SD} (2)	Source-drain current (pulsed)		-		800	A
V_{SD} (3)	Forward on voltage	I_{SD} = 120 A, V_{GS} = 0	-		1.5	V
t_{rr}	Reverse recovery time	I_{SD} = 120 A, di/dt = 100 A/µs V_{DD} = 20 V, T_j = 150 °C	-	80		ns
Q_{rr}	Reverse recovery charge		-	180		nC
I_{RRM}	Reverse recovery current		-	4.5		A

1. Current limited by package
2. Pulse width limited by safe operating area
3. Pulsed: Pulse duration = 300 µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 3. Safe operating area

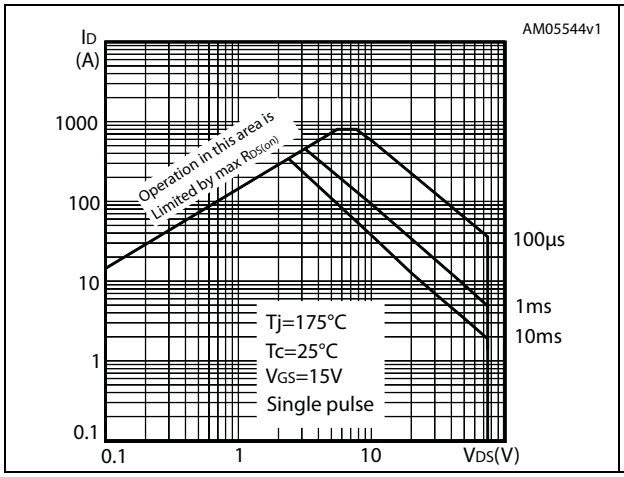


Figure 4. Thermal impedance

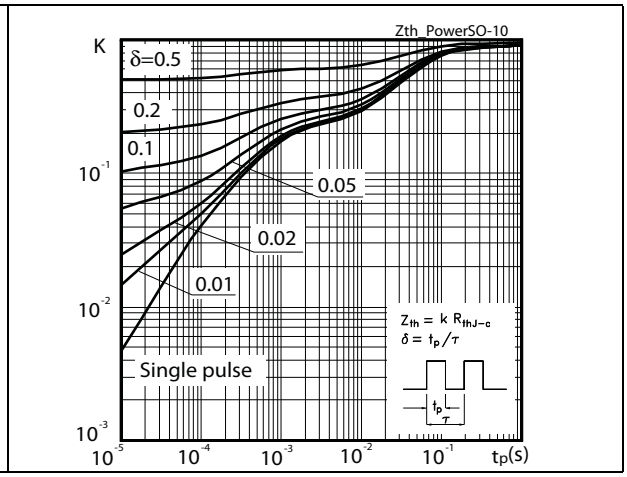


Figure 5. Output characteristics

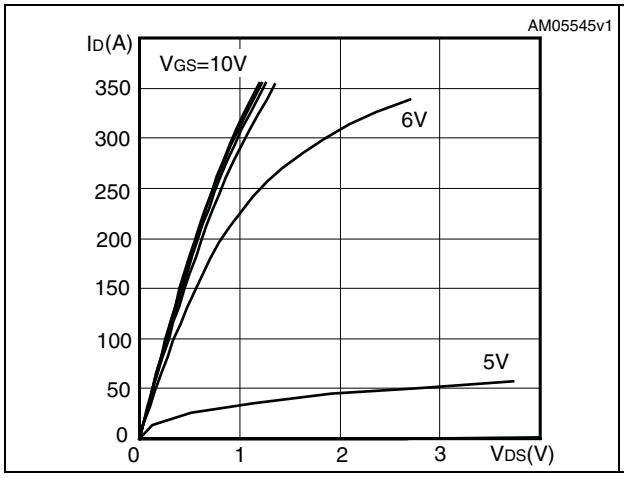


Figure 6. Transfer characteristics

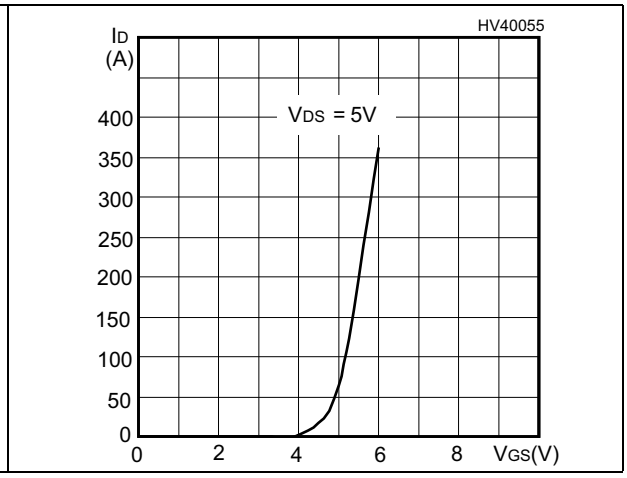


Figure 7. Normalized BV_{DSS} vs temperature

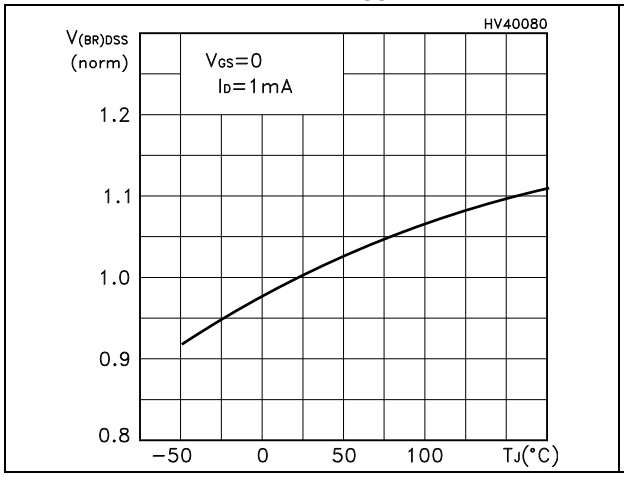


Figure 8. Static drain-source on-resistance

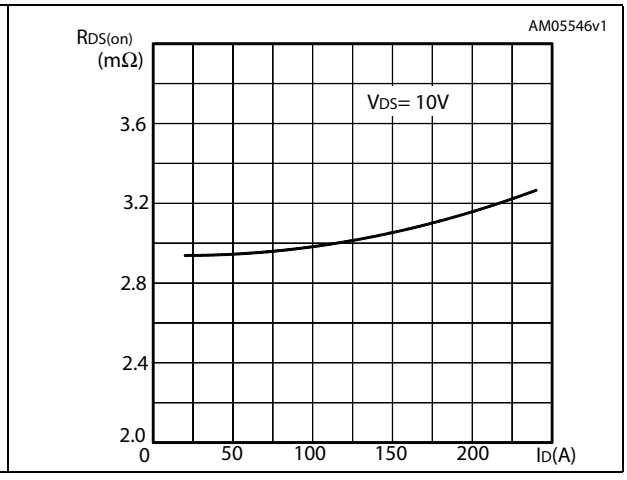


Figure 9. Gate charge vs gate-source voltage

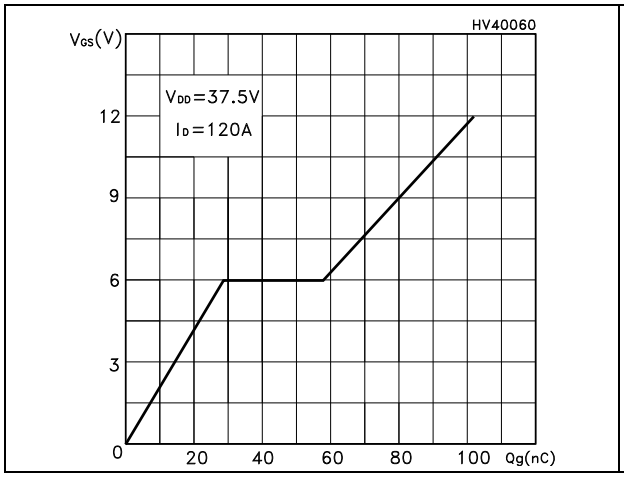


Figure 10. Capacitance variations

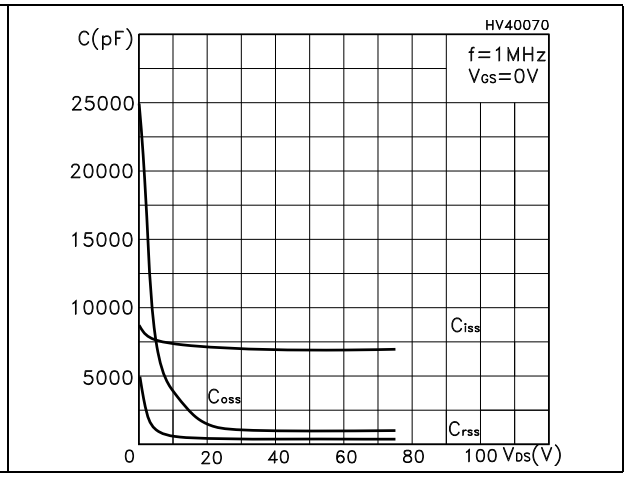


Figure 11. Normalized gate threshold voltage vs temperature

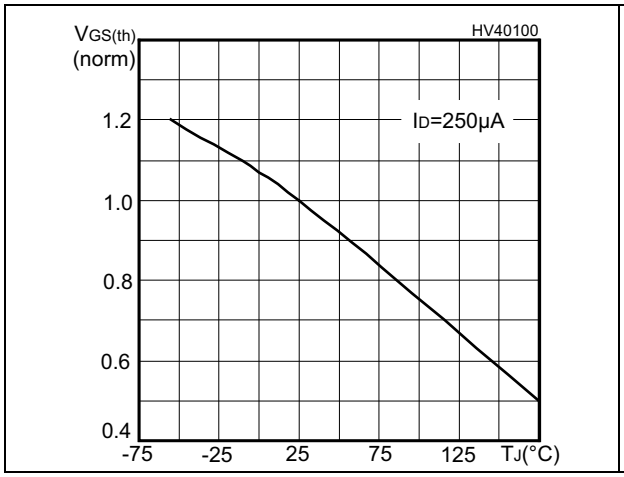


Figure 12. Normalized on-resistance vs temperature

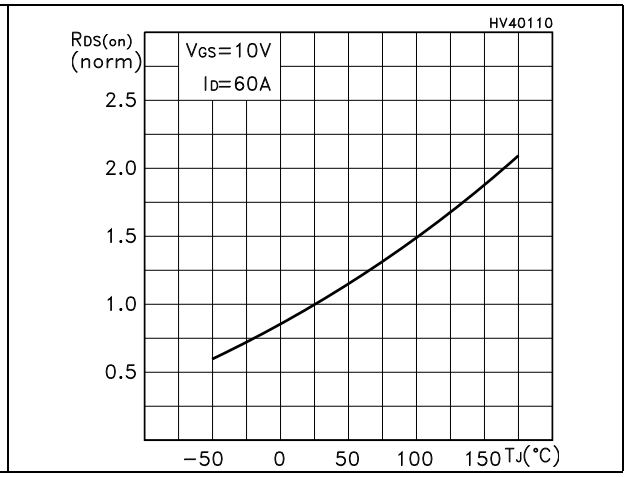
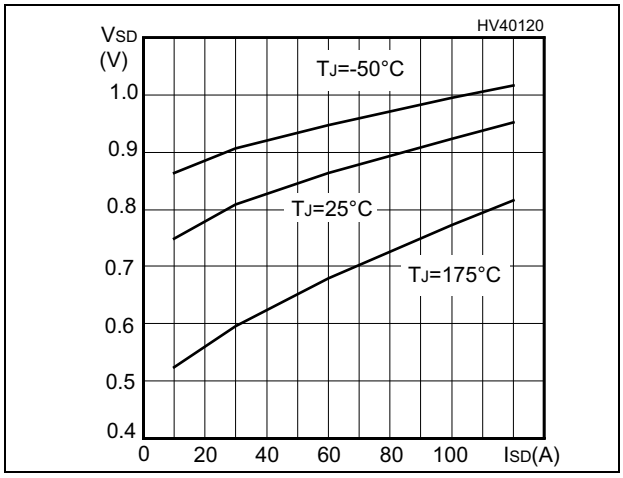


Figure 13. Source-drain diode forward characteristics



3 Test circuits

Figure 14. Switching times test circuit for resistive load

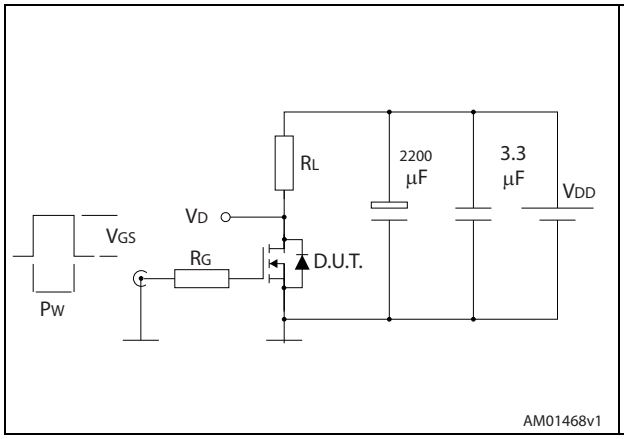


Figure 15. Gate charge test circuit

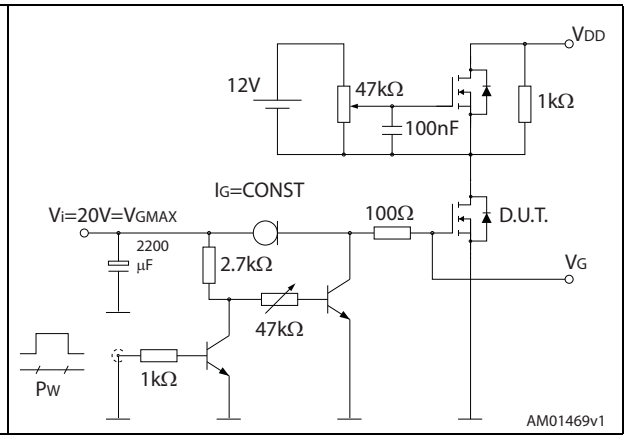


Figure 16. Test circuit for inductive load switching and diode recovery times

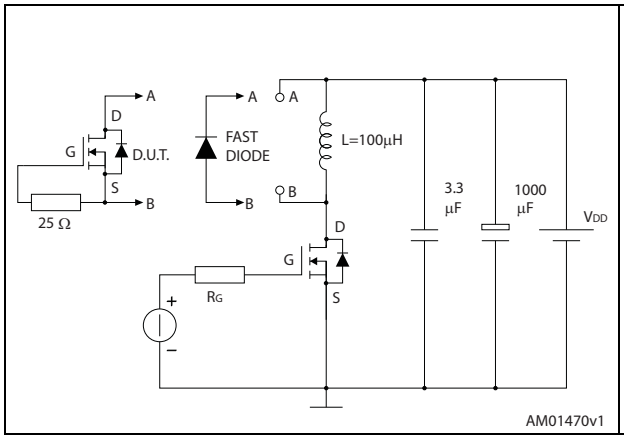


Figure 17. Unclamped inductive load test circuit

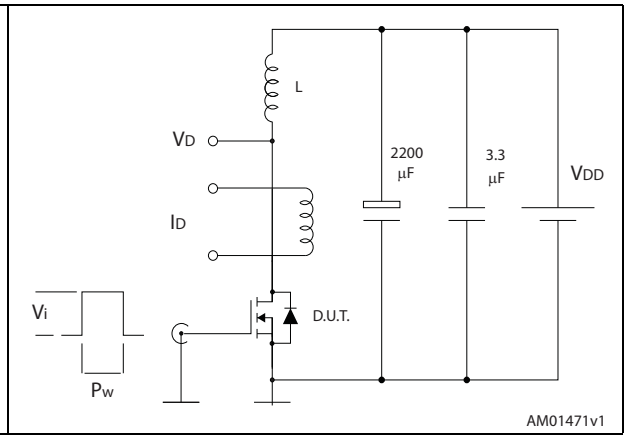


Figure 18. Unclamped inductive waveform

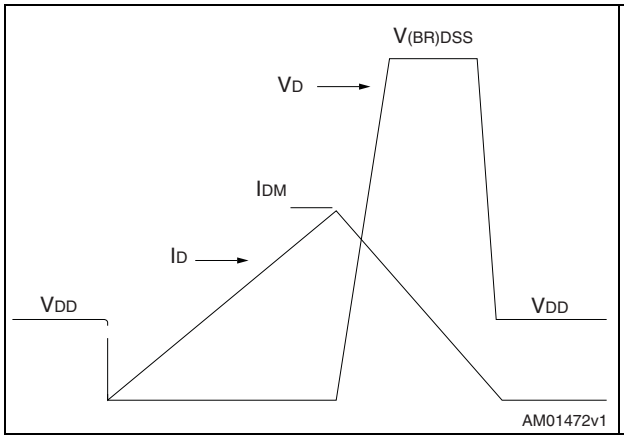
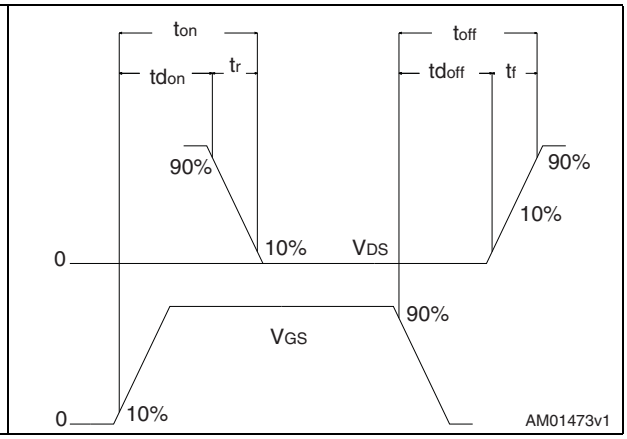


Figure 19. Switching time waveform



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.

Figure 20. PowerSO-10 drawing

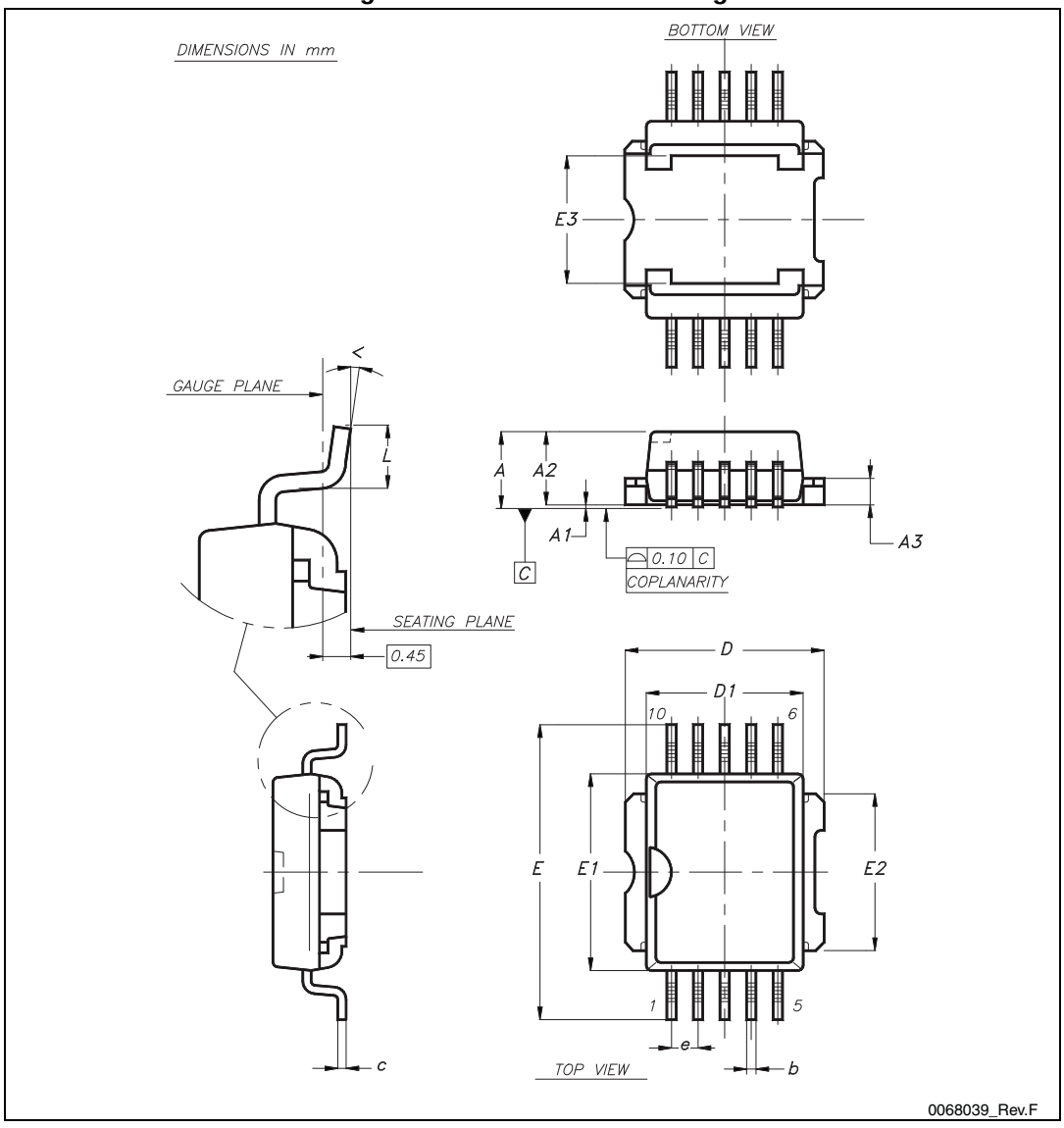
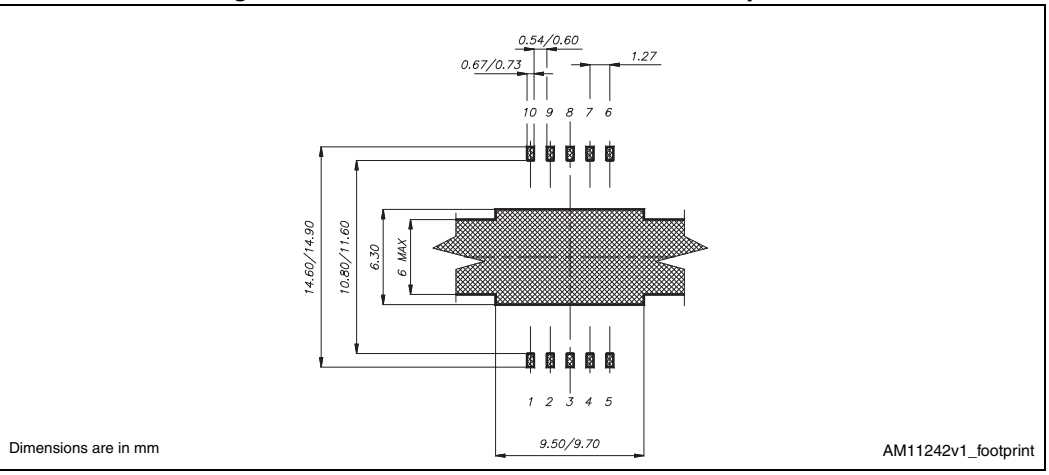


Table 8. PowerSO-10 mechanical data

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 (1)	7.40		7.60
E	13.80		14.40
E1 (1)	9.30		9.50
E2	7.20		7.60
E3	5.90		6.10
e		1.27	
L	0.95		1.65
<	0^o		8^o

1. Resin protrusion not included (max value: 0.20 mm per side)

Figure 21. PowerSO-10 recommended footprint



5 Packaging mechanical data

Figure 22. Carrier tape drawing [(a)]

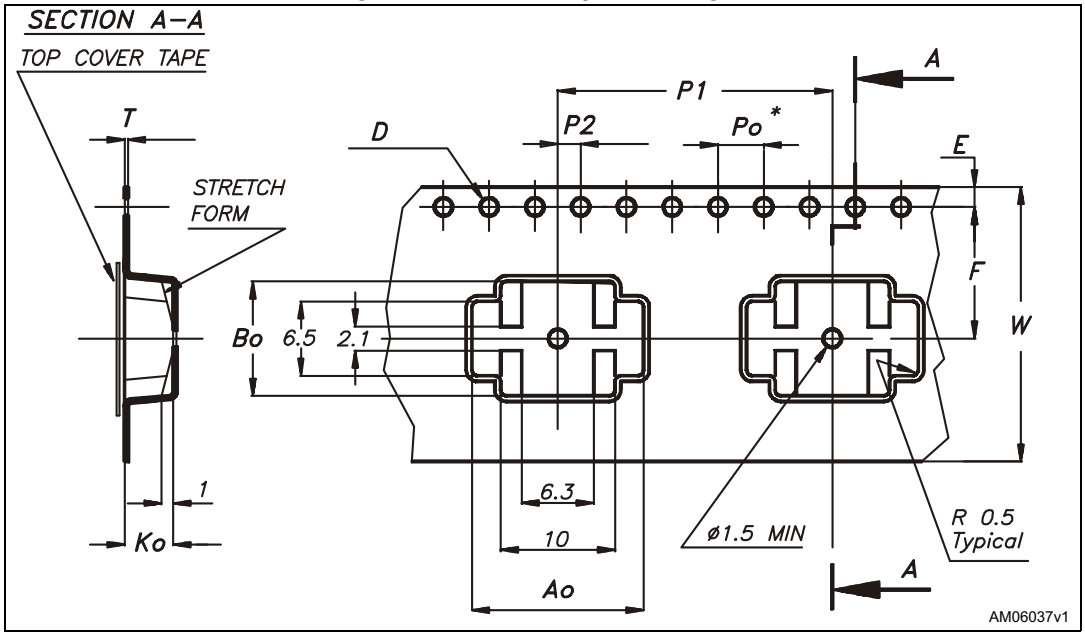


Table 9. Carrier tape dimensions

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.

a. Drawing is not to scale.

Figure 23. Reel drawing (b)

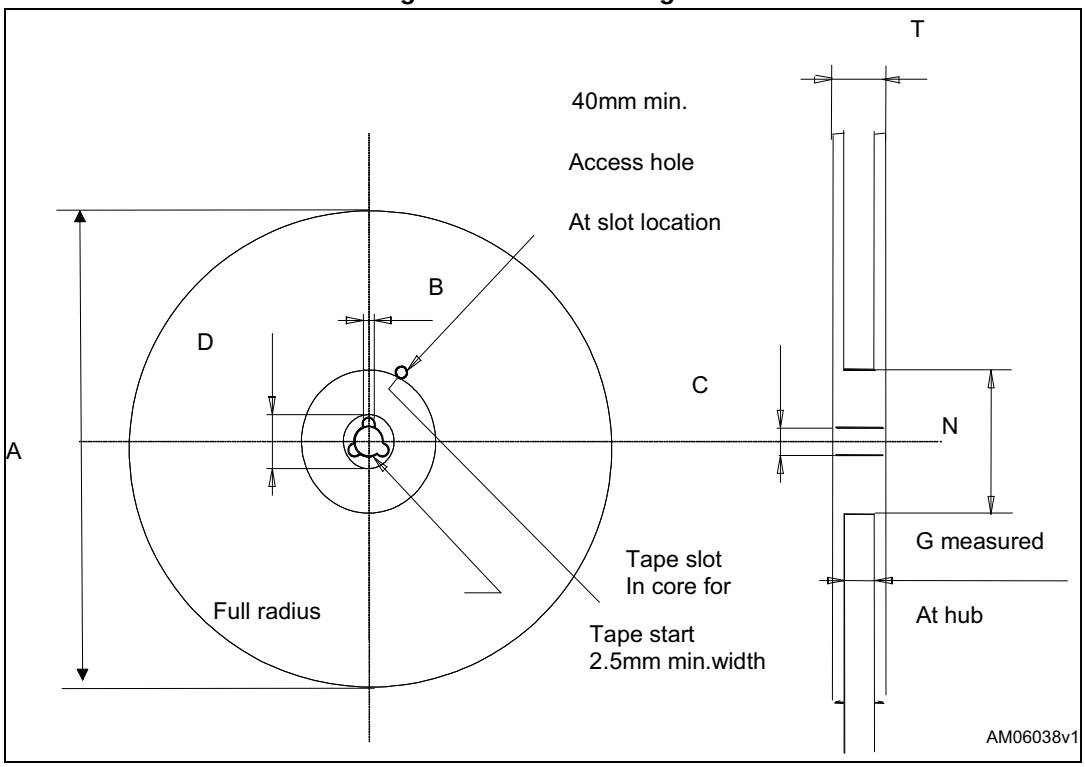


Table 10. Reel dimensions

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.

Table 11. Base/bulk quantities

Base qty.	Bulk qty.
600	

b. Drawing is not to scale.

6 Revision history

Table 12. 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 *Section 5: Packaging mechanical data*.
4-May-2012	3	*Section 4: Package mechanical data* has been updated: – *Figure 21: PowerSO-10 recommended footprint* has been added. – Minor text changes.
27-Nov-2014	4	Updated title and description in cover page. Updated *Figure 3: Safe operating area* and *Figure 8: Static drain-source on-resistance*.