



## DB-55025-540

RF power amplifier using 1 x PD55025  
N-channel enhancement-mode lateral MOSFETs

### Features

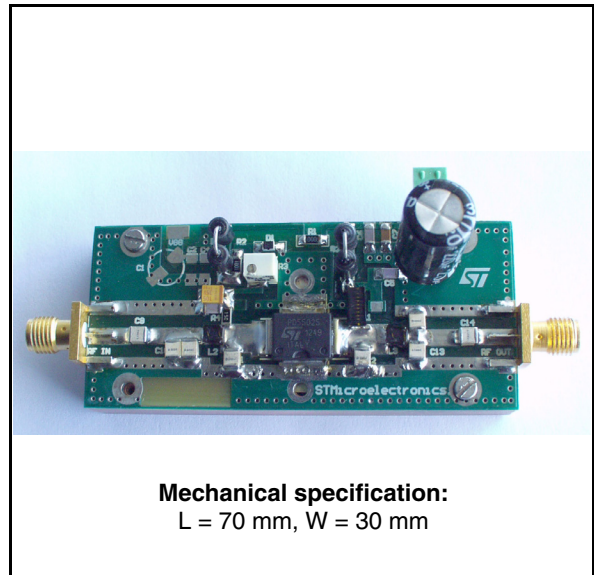
- Excellent thermal stability
- Frequency: 460 - 540MHz
- Supply voltage: 13.6V
- Output power: 20W
- Gain:  $12.5 \pm 0.5\text{dB}$
- Efficiency: 51% - 66%
- Load mismatch: 20:1
- BeO free amplifier
- In compliance with the 2002/95/EC european directive

### Description

The DB-55025-540 is a common source N-channel Enhancement-Mode Lateral Field Effect RF power amplifier designed for UHF mobile radio applications.

### Order code

- DB-55025-540



# Contents

<b>1</b>	<b>Electrical data</b> .....	<b>3</b>
	1.1 Maximum ratings .....	3
<b>2</b>	<b>Electrical characteristics</b> .....	<b>3</b>
<b>3</b>	<b>Typical performance</b> .....	<b>4</b>
<b>4</b>	<b>Test circuit</b> .....	<b>6</b>
<b>5</b>	<b>Circuit layout</b> .....	<b>7</b>
<b>6</b>	<b>Mounting indications</b> .....	<b>9</b>
<b>7</b>	<b>Package mechanical data</b> .....	<b>10</b>
<b>8</b>	<b>Revision history</b> .....	<b>14</b>

# 1 Electrical data

## 1.1 Maximum ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DD}$	Supply voltage	20	V
$I_D$	Drain current	3	A
$T_{CASE}$	Operating case temperature	-20 to +85	°C
$T_A$	Max. ambient temperature	+55	°C

## 2 Electrical characteristics

$T_A = +25\text{ °C}$ ,  $V_{DD} = 13.6\text{V}$ ,  $I_{dq} = 150\text{mA}$

**Table 2. Electrical specification**

Symbol	Test conditions	Min	Typ	Max	Unit
Freq	Frequency range	460		540	MHz
$P_{OUT}$			20		W
Gain	@ $P_{OUT} = 20\text{W}$		$12.5 \pm 0.5$		dB
Efficiency	@ $P_{OUT} = 20\text{W}$		51 - 66		%
H2	@ $P_{OUT} = 20\text{W}$	-48		-55	dB
H3	@ $P_{OUT} = 20\text{W}$	-55		-60	dB
VSWR	Load Mismatch all phases @ $P_{OUT} = 20\text{W}$			20:1	

### 3 Typical performance

Figure 1. Gain vs frequency

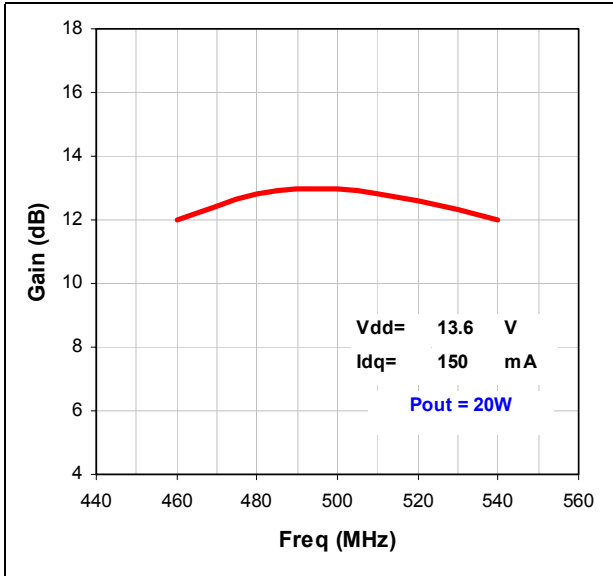


Figure 2. Efficiency vs frequency

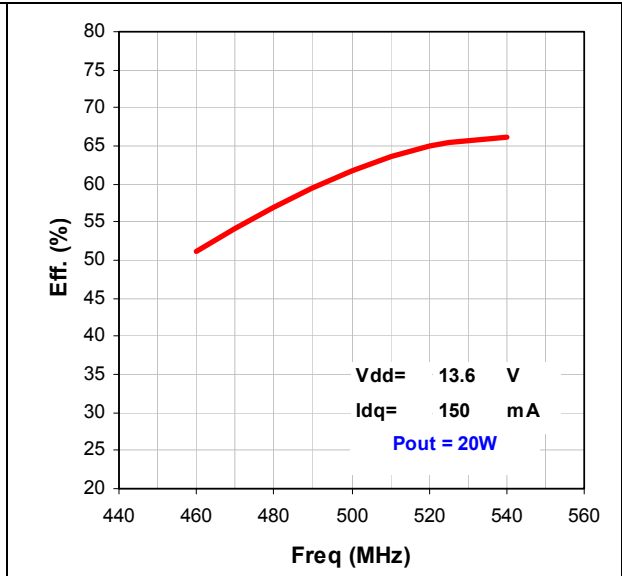


Figure 3. Harmonics vs frequency

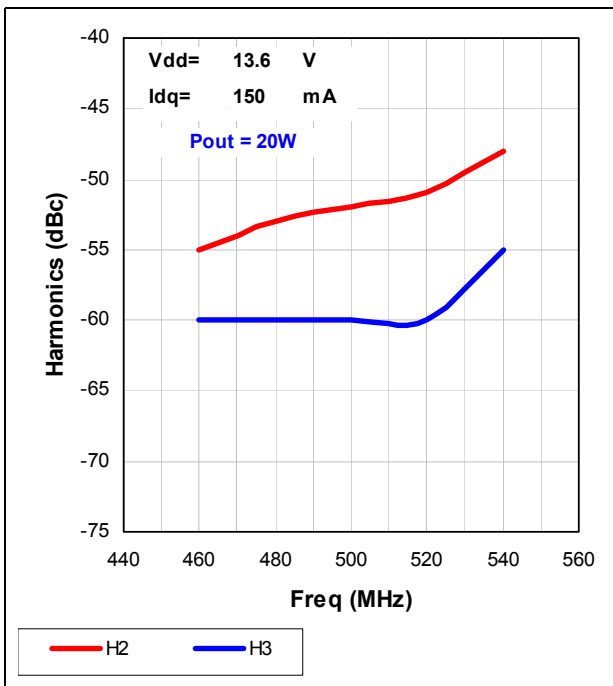


Figure 4. Output power vs drain supply voltage

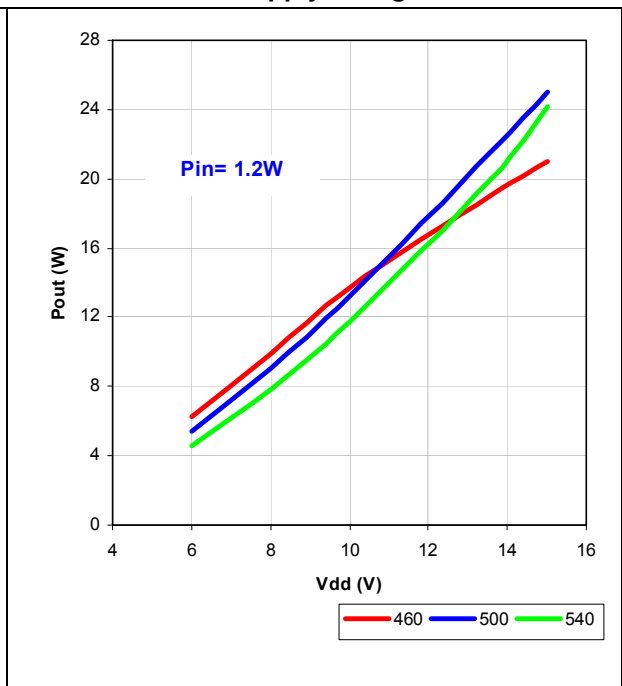
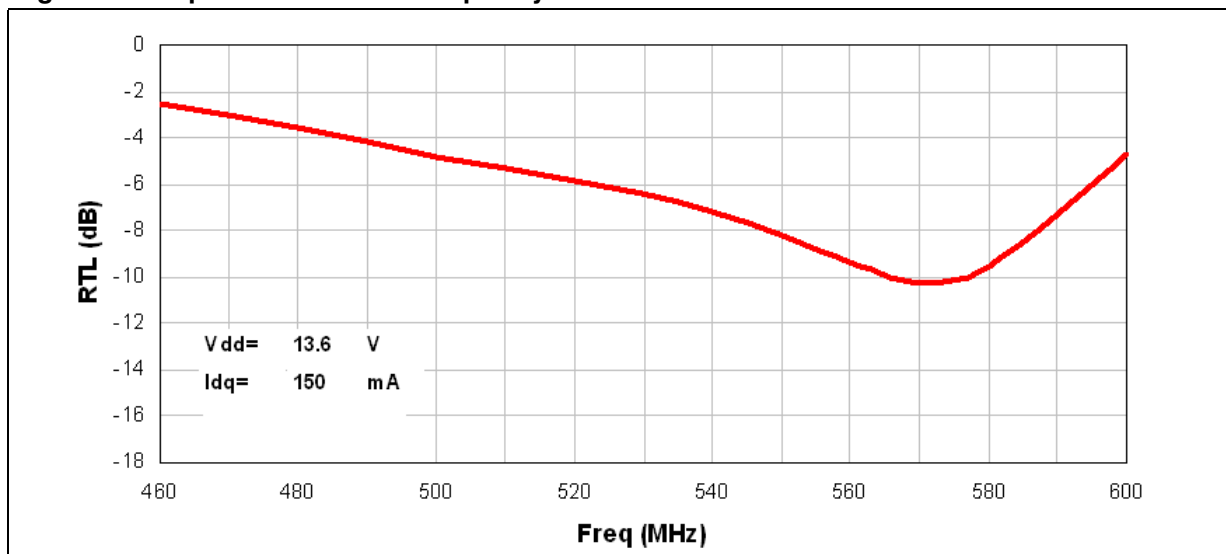
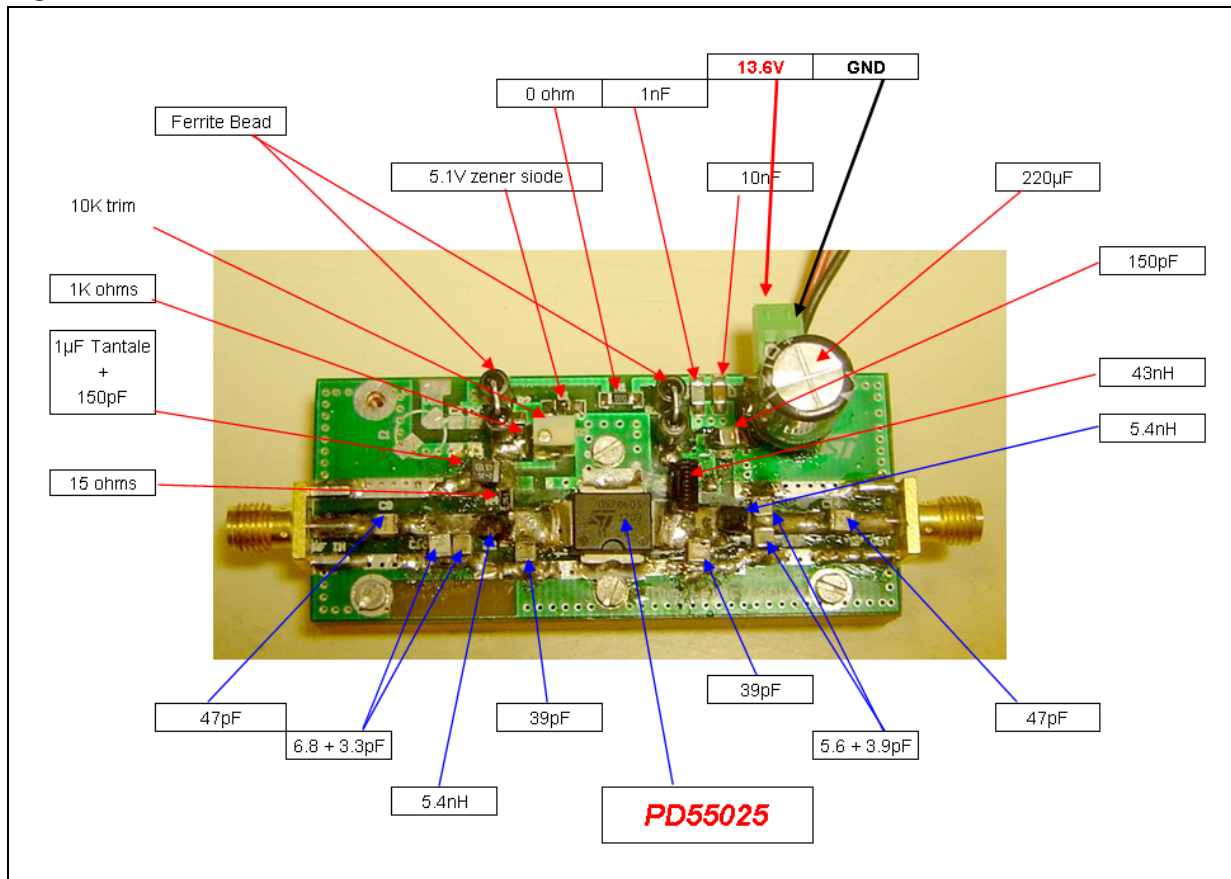


Figure 5. Input return loss vs frequency



# 4 Test circuit

Figure 6. Test circuit schematic



# 5 Circuit layout

Figure 7. Circuit layout

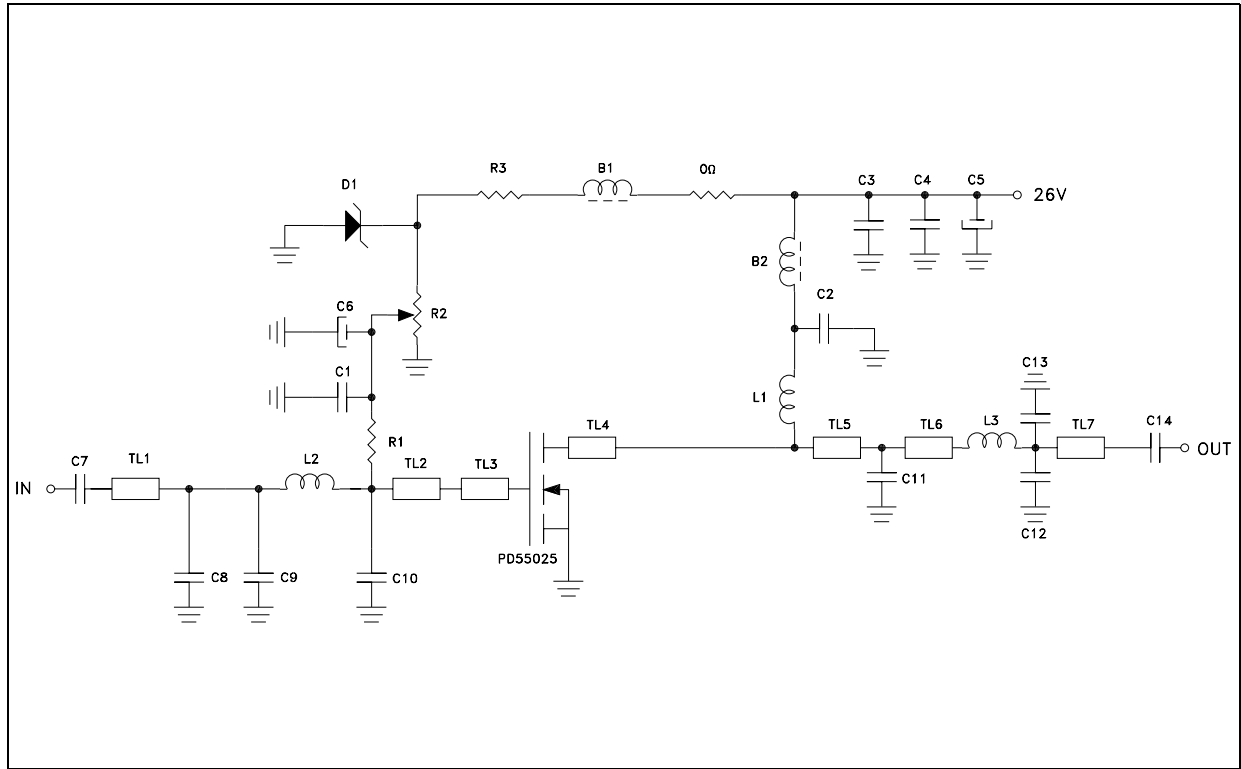


Table 3. Component part list

Part type	Component ID	Description	Value	Case size	Manufacturer	Part code
CAP	C1	Capacitor	150pF	1206	Murata	GRM42-6C0G151J50
CAP	C2	Capacitor	150pF	1206	Murata	GRM42-6C0G151J50
CAP	C3	Capacitor	1 nF	1206	Murata	GRM42-6C0G102J50
CAP	C4	Capacitor	10 nF	1206	Murata	GRM42-6X7R104K50
Electrolytic CAP	C5	Capacitor	220 μF			
Tantale CAP	C6	Capacitor	1 μF			
CAP	C7	Capacitor	47pF	100B	ATC	470
CAP	C8	Capacitor	3.3pF	100B	ATC	3R3
CAP	C9	Capacitor	6.8pF	100B	ATC	6R8
CAP	C10	Capacitor	39pF	100B	ATC	390
CAP	C11	Capacitor	39pF	100B	ATC	390

Table 3. Component part list (continued)

Part type	Component ID	Description	Value	Case size	Manufacturer	Part code
CAP	C12	Capacitor	5.6pF	100B	ATC	5R6
CAP	C13	Capacitor	3.9pF	100B	ATC	3R9
CAP	C14	Capacitor	47pF	100B	ATC	470
TL	TL1, TL7	Transmission Line	W = 2.87 mm L = 6 mm			
TL	TL2	Transmission Line	W = 4.9 mm L = 5 mm			
TL	TL3, TL4	Transmission Line	W = 6 mm L = 3 mm			
TL	TL5	Transmission Line	W = 4.9 mm L = 2.5 mm			
TL	TL6	Transmission Line	W = 4.9 mm L = 2.5 mm			
Ferrite Bead	B1	Ferrite Bead			PANASONIC	EXCELDRC35C
Ferrite Bead	B2	Ferrite Bead			PANASONIC	EXCELDRC35C
INDUCTOR	L1	Inductor	43nH		Coilcraft Mini Spring	B10TJ
INDUCTOR	L2	Inductor	5nH		Coilcraft Mini Spring	A02TJ
INDUCTOR	L3	Inductor	5nH		Coilcraft Mini Spring	A02TJ
TRANSISTOR	PD55025	LDMOS			STMicroelectronics	PD55025
Resistor	R1	Resistor	15 ohms	1206	TYCO ELECTRONICS	01623440-1
POT	R2	Potentiometer	10 K		BOURNS ELECTRONICS	3214W-1-103E
Resistor	R3	Resistor	1K	1206	TYCO ELECTRONICS	01623440-1
SMA-CONN	RF in	SMA-CONN			Johnson	142-0701-801
SMA-CONN	RF out	SMA-CONN			Johnson	142-0701-801
ZENER	D1	Zener Diode	5.1 V	SOD110	PHILIPS	BZX284C5V1
BOARD	FR-4 THk=0.060" 2OZ Cu Both Sides					



## 6 Mounting indications

Figure 8. PowerSO-10 mounting indications

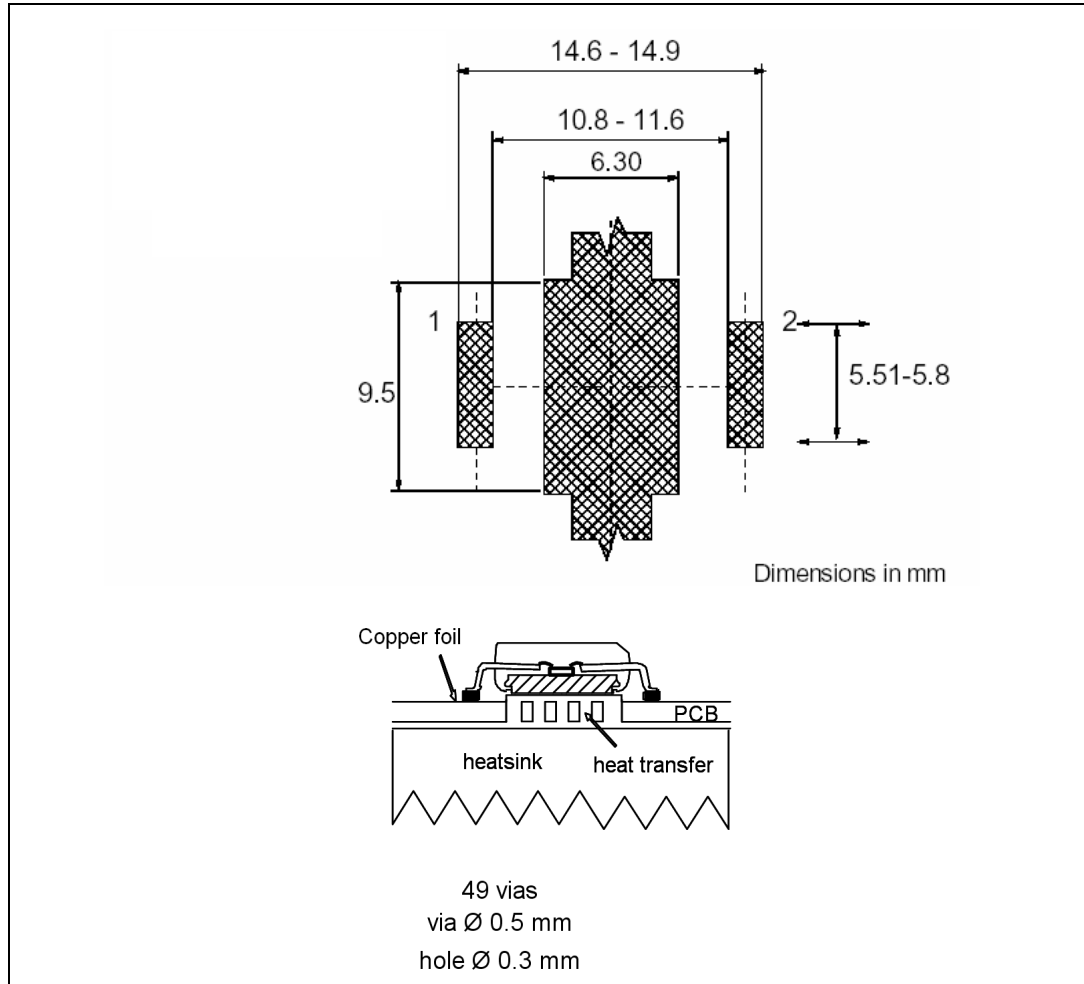
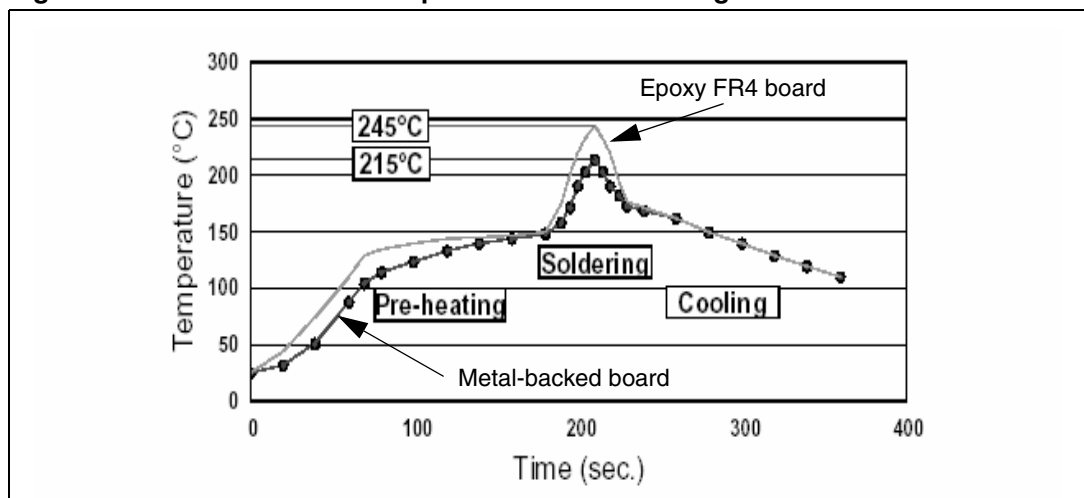


Figure 9. Recommended heat profile / reflow soldering



## 7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

**Table 4. PowerSO-10RF formed lead (Gull Wing) mechanical data**

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A1	0	0.05	0.1	0.	0.0019	0.0038
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	13.85	14.1	14.35	0.544	0.555	0.565
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
L	0.8	1	1.1	0.030	0.039	0.042
R1			0.25			0.01
R2		0.8			0.031	
T	2 deg	5 deg	8 deg	2 deg	5 deg	8 deg
T1		6 deg			6 deg	
T2		10 deg			10 deg	

*Note: Resin protrusions not included (max value: 0.15 mm per side)*

**Figure 10. Package dimensions**

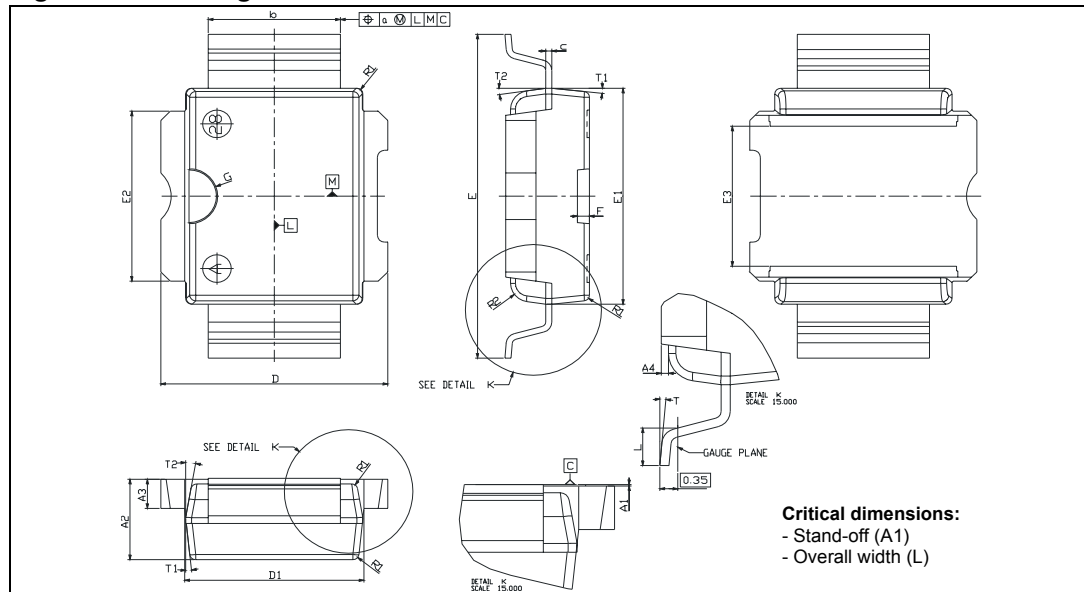
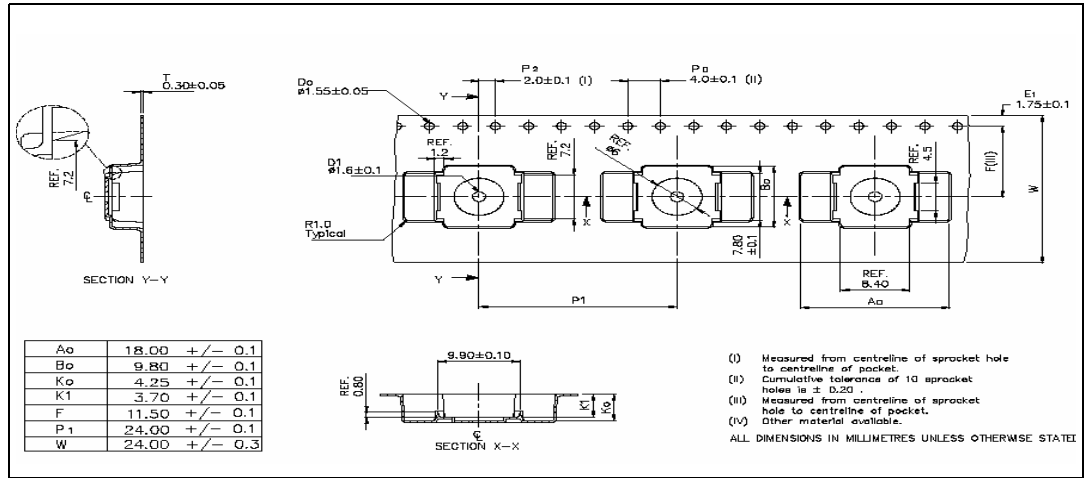


Figure 11. PowerSO-10RF tape & reel



## 8 Revision history

**Table 5. Revision history**

Date	Revision	Changes
20-Jun-2006	1	Initial release
31-Jul-2007	2	Updated <a href="#">Table 2 on page 3</a>

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