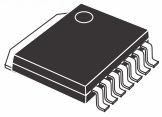
LNBP8
LNBP9

LNB SUPPLY AND CONTROL VOLTAGE REGULATOR

- SIMPLEST INTEGRATED SOLUTION FOR THE LNB REMOTE SUPPLY AND CONTROL
- 500mA GUARANTEED OUTPUT CURRENT
- DUAL INPUT SUPPLY FOR REDUCING POWER DISSIPATION
- 22KHZ BUILT-IN TONE OSCILLATOR (LNBP9 VERSION)
- FAST OSCILLATOR START-UP FOR DiSEqC^{TM} ENCODING (LNBP9 VERSION)
- AUXILIARY MODULATION INPUT FOR MORE FLEXIBILITY (LNBP8 VERSION)
- STAND-BY FUNCTION
- SHORT CIRCUIT AND OVERTEMPERATURE PROTECTION
- AVAILABLE IN THRU-HOLE PACKAGE



SPAK-7L
(PowerFlex^{TM})

DESCRIPTION

Intended for analog and digital satellite receivers, the LNBP is a monolithic linear voltage regulator, assembled in PowerFlex^{TM}, specifically designed to provide the powering voltages and the interfacing signals to the LNB down-converter.
The regulator output can be logic controlled to be 13V or 18V (typ.) by mean of the V_{SEL} pin for the remote controlling of the LNB. In order to reduce the power dissipation of the device when the lowest output voltage is selected, the regulator has 2 supply inputs (V_{CC1} and V_{CC2}). They must be powered respectively at 15V (min.) and 22V (min.), and an internal switch will automatically select the appropriate supply voltage according to the selected output voltage.
The TONE pin (only for the LNBP9 version) activates the internal oscillator so that the DC output is modulated by a 22KHz square wave. This internal oscillator is factory trimmed within a tolerance of +/- 2KHz, thus no further adjustment or external components are required.
A burst coding of the 22KHz tone can be accomplished thanks to the fast response of the TONE input and the prompt oscillator start-up. This helps designers which want to implement the DiSEqC^{TM} protocols.
In order to improve design flexibility and to allow implementation of other LNB remote control standards, an analogic modulation input pin (EXTM) is available (LNBP8 version only). An appropriate DC blocking capacitor must be used to couple the modulating signal source to the EXTM pin.
Both versions integrate thermal and short circuit protection.
The device is packaged in PowerFlex for an easy thru-hole mounting. If an adequate Heatsink is provided and higher power losses are acceptable, both supply pins can be powered by the same 23V source without affecting any other circuit performance.
When the IC is powered and put in Stand-by (EN pin LOW), the regulator output is disabled and the IC power consumption is reduced to 300µA typ.

Table 1: Order Codes

TYPE	SPAK-7L	TAPE & REEL
LNBP8	LNBP8K7	LNBP8K7-R
LNBP9	LNBP9K7	LNBP9K7-R

Figure 1: Pin Configuration (top view)

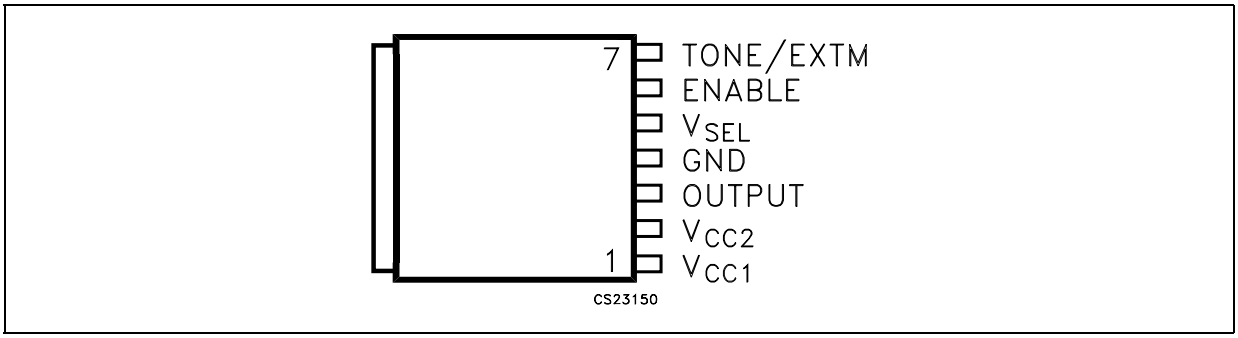


Table 2: Pin Descriptions

PIN N°	NAME	FUNCTION
1	V_{CC1}	Supply Input 1: 15V to 25V supply. It is automatically selected when V_O = 13V
2	V_{CC2}	Supply Input 2: 22V to 25V supply. It is automatically selected when V_O = 18V
3	OUTPUT	Regulator output. It is 13V typ. when V_{SEL} LOW and 18V typ. when V_{SEL} HIGH
4	GND	GROUND
5	V_{SEL}	Output Voltage Selection: Logic Control Input; if LOW V_O = 13V, when HIGH V_O = 18V
6	ENABLE	Logic Control Input; force LOW to put the IC in shutdown
7 (LNBP9)	TONE	Logic Control Input; force HIGH to activate the internal 22KHz tone
7 (LNBP8)	EXTM	External Modulation: Needs DC decoupling to the AC source. If not used can be left floating

Table 3: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC1}, V_{CC2}	Input Voltage	-0.3 to 28	V
ENABLE, TONE, V_{SEL}	Logic Input Voltage	-0.3 to 7	V
OUTPUT	Output Voltage	-0.3 to 28	V
T_J	Operating Junction Temperature Range	-40 to 125	°C
T_{STG}	Storage Temperature Range	-55 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 4: Thermal Data

Symbol	Parameter	Value	Unit
R_{THJ-C}	Thermal Resistance Junction-case	2	°C/W

Figure 2: Block Diagram

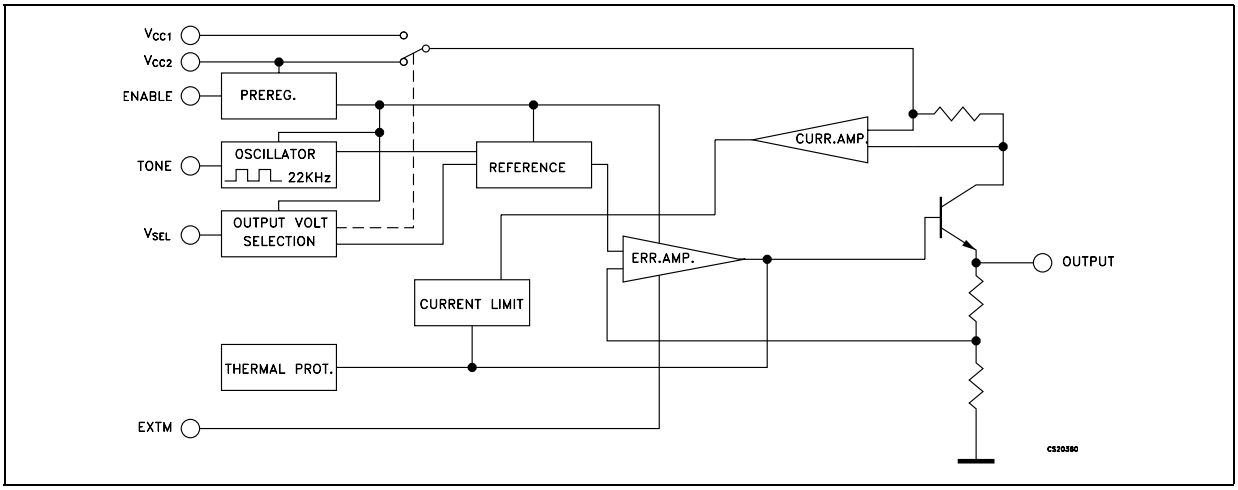


Table 5: Electrical Characteristics (V_{CC1} = 16V, V_{CC2} = 22V, C_{I1} = C_{I2} = 0.22µF, C_O =0.1µF, ENABLE = H, TONE = L (LNBP9), EXTM floating (LNBP8), I_O = 50mA, T_J = 0 to 85°C unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CC1}	V_{CC} Supply Input 1	I_O = 500 mA, TONE = H, V_{SEL} = L	15		25	V
V_{CC2}	V_{CC} Supply Input 2	I_O = 500 mA, TONE = H, V_{SEL} = H	22		25	V
V_O	Output Voltage	I_O = 500 mA, V_{SEL} = L	12.5	13	13.5	V
		I_O = 500 mA, V_{SEL} = H	17.3	18	18.7	V
ΔV_O	Line Regulation	V_{CC1} = 15 to 18V, V_{SEL} = L		4	40	mV
		V_{CC2} = 22 to 25V, V_{SEL} = H		4	40	
ΔV_O	Load Regulation	V_{CC1} = V_{CC2} = 22V, I_O = 50 to 500mA V_{SEL} = L or H		80	180	mV
I_{MAX}	Output Current Limiting		500		800	mA
f_{TONE}	Tone Frequency	LNBP9 version, TONE = H	20	22	24	KHz
A_{TONE}	Tone Amplitude	LNBP9 version, TONE = H	0.55	0.72	0.9	V
D_{TONE}	Tone Duty Cycle	LNBP9 version, TONE = H	40	50	60	%
t_r, t_f	Tone Rise and Fall Time	LNBP9 version, TONE = H	5	10	15	µs
G_{EXTM}	External Modulation Gain	LNBP8 version, $\Delta V_O/\Delta V_{EXTM}$, f = 10Hz to 40KHz		5		
V_{EXTM}	External Modulation Input Voltage	LNBP8 version, AC Coupling			400	mV
Z_{EXTM}	External Modulation Impedance	LNBP8 version, f = 10Hz to 40KHz		400		Ω
V_{IL}	Control Input Logic LOW	ENABLE, TONE (LNBP9 version), V_{SEL}			0.8	V
V_{IH}	Control Input Logic HIGH	ENABLE, TONE (LNBP9 version), V_{SEL}	2.5			V
I_{IH}	Control Pins Input Current	V_{IH} = 5V, ENABLE, TONE (LNBP9 version), V_{SEL}		20		µA
I_{CC}	Supply Current	Output Disabled (ENABLE = L)		0.3	1	mA
		Output Enabled (ENABLE = H), TONE = H I_O = 500mA		3	6	mA
T_{SHDN}	Temperature Shutdown			150		°C

TYPICAL APPLICATION CIRCUITS

Figure 3: LNBP9 with 22KHz Tone Control Pin

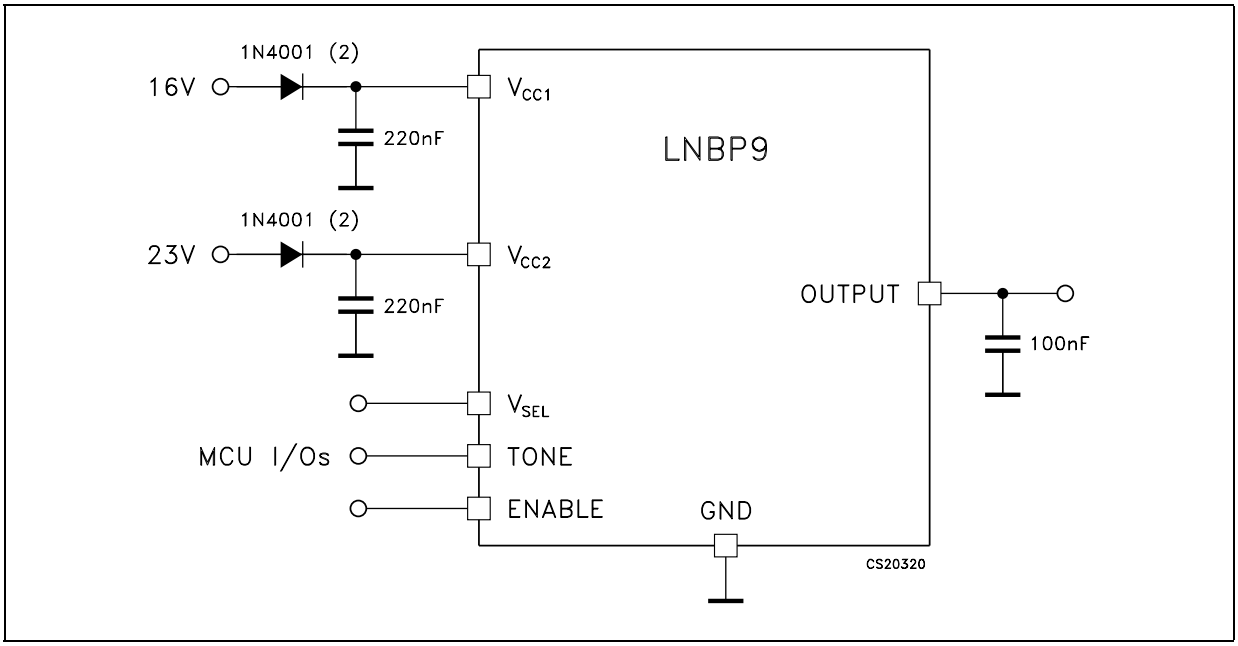


Figure 4: LNBP8 with external 22KHz Input Pin (EXTM)

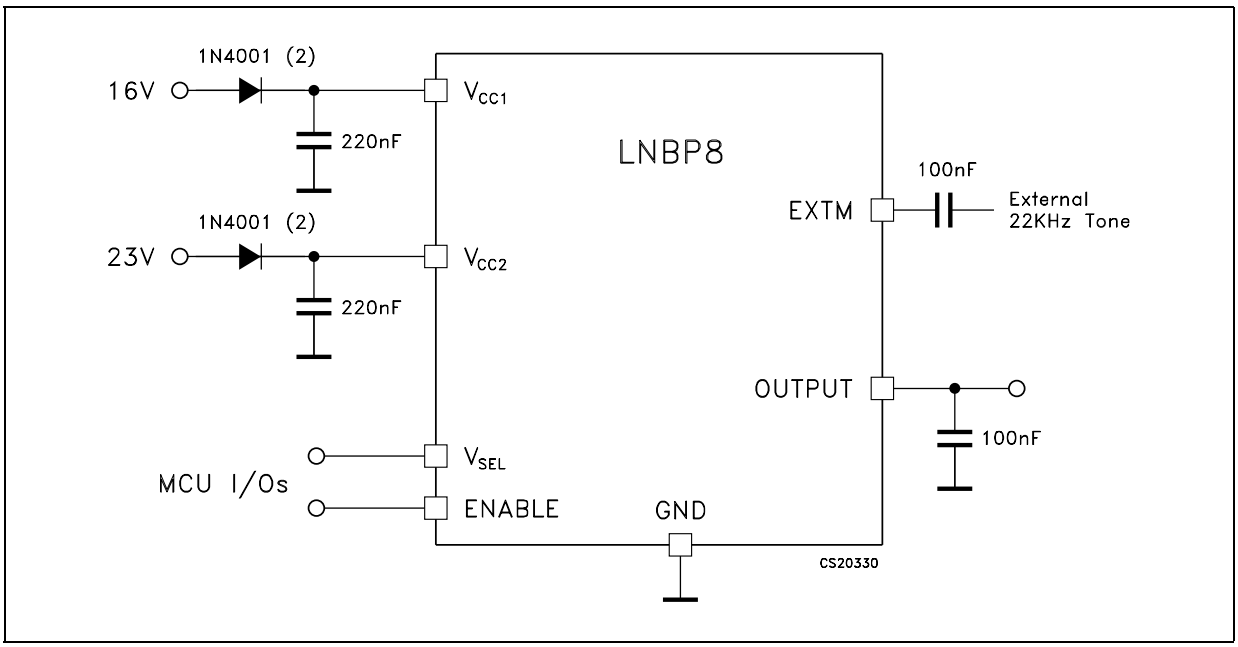
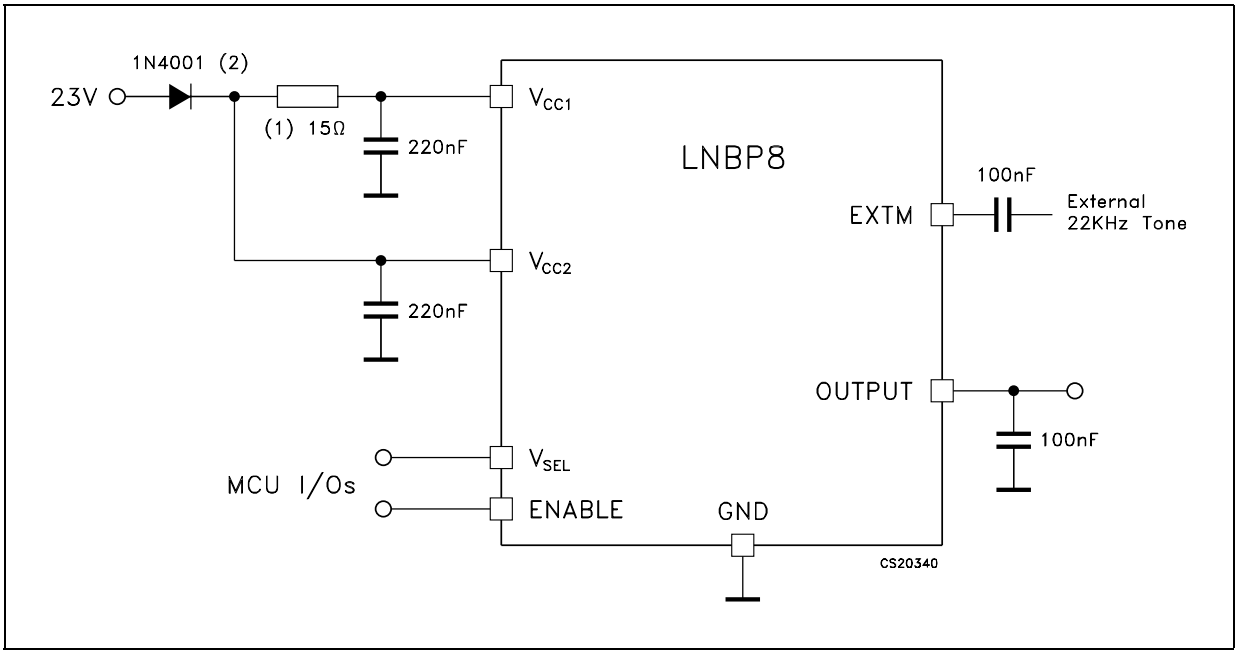


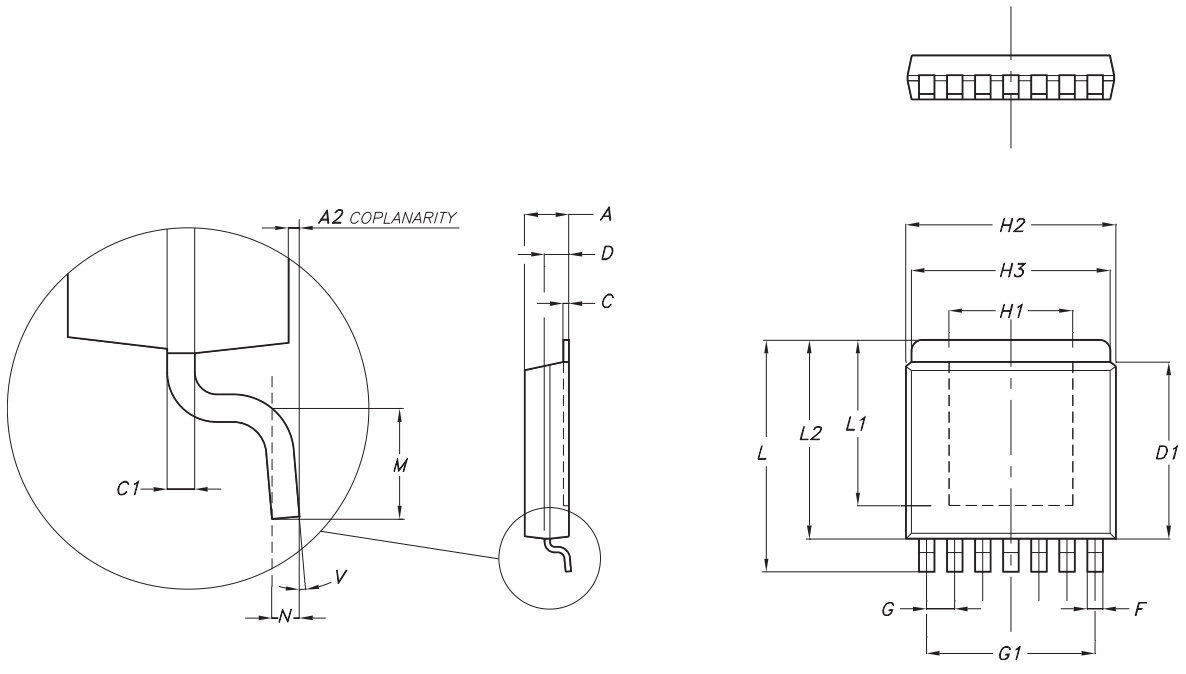
Figure 5: Single Supply Solution



(1) In a single supply configuration the presence of the input resistor in the 12-15Ω range is suggested only to reduce the device power dissipation during the 13V output condition. The resistor can be omitted in spite of power dissipation increase.
(2) The input diodes are mandatory to protect the device from any reverse current.

SPAK-7L MECHANICAL DATA

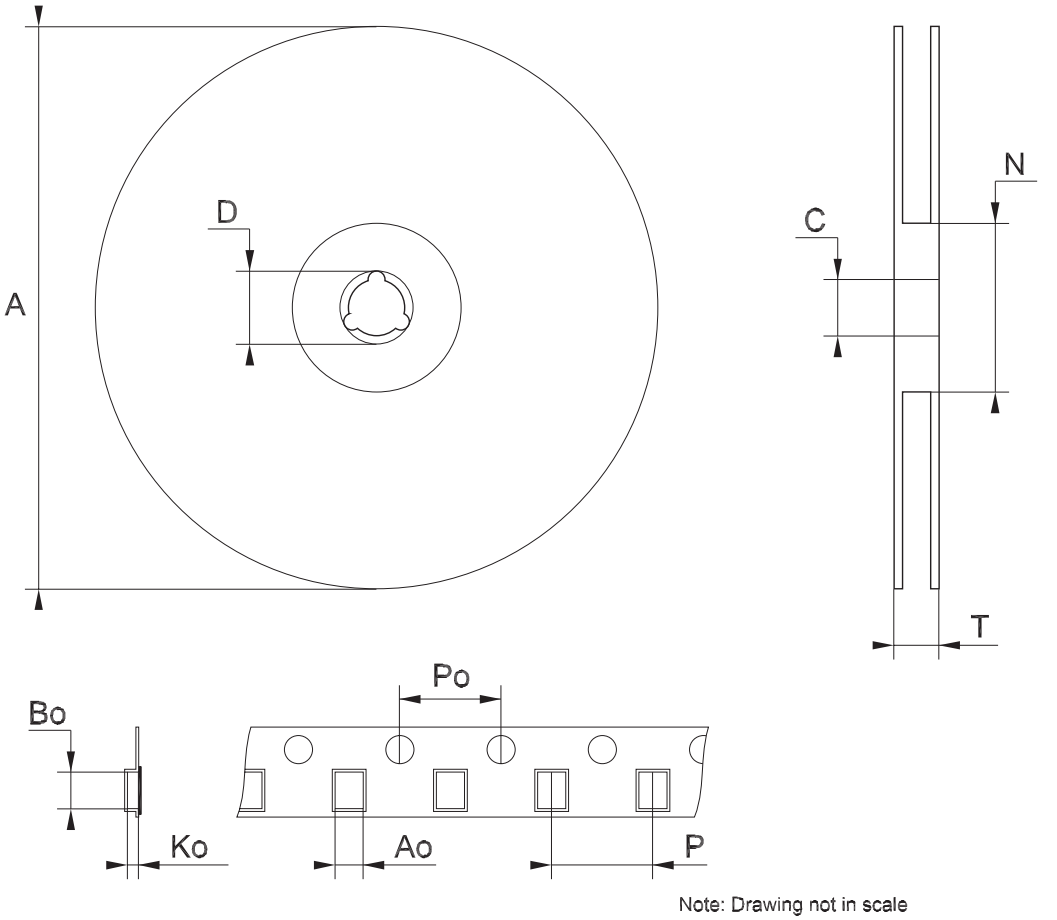
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.78		2.03	0.070		0.080
A2	0.03		0.13	0.001		0.005
C		0.25			0.010	
C1		0.25			0.010	
D	1.02		1.27	0.040		0.050
D1	7.87		8.13	0.310		0.320
F	0.63		0.79	0.025		0.031
G		1.27			0.050	
G1		7.62			0.3	
H1		5.59			0.220	
H2	9.27		9.52	0.365		0.375
H3	8.89		9.14	0.350		0.360
L	10.41		10.67	0.410		0.420
L1		7.49			0.295	
L2	8.89		9.14	0.350		0.360
M	0.79		1.04	0.031		0.041
N		0.25			0.010	
V	3°		6°	3°		6°



PO13F2/A

Tape & Reel SPAK-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	9.70	9.80	9.90	0.382	0.386	0.390
Bo	10.85	10.95	11.05	0.423	0.427	0.431
Ko	2.30	2.40	2.50	0.090	0.094	0.098
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	11.9	12.0	12.1	0.468	0.472	0.476



Note: Drawing not in scale

Table 6: Revision History

Date	Revision	Description of Changes
09-Nov-2004	1	First Release.
04-Jul-2005	2	Remove Package Heptawatt and Add Package SPAK-7L.