

The SP8402 is a very low phase noise divider which divides by powers of two. The S0, S1, S2 data inputs select the division ratio in the range  $2^1$  to  $2^8$ . Special circuits techniques have been used to reduce the phase noise considerably below that produced by standard dividers. The data inputs are CMOS or TTL compatible.

The SP8402 is packaged in a 28 pin plastic SO package to be compatible with the SP8400 and SP8401 devices.

### FEATURES

- Very low Phase Noise (Typically -155 to 160dBc/Hz at 1kHz offset)
- Supply Voltage 5V

### ABSOLUTE MAXIMUM RATINGS

Supply Voltage	6.5V
Output Current	20mA
Storage Temperature Range	-55°C to +125°C
Maximum Clock Input Voltage	2.5V p-p

### ORDERING INFORMATION

SP8402 KG MPES (Commercial Grade)

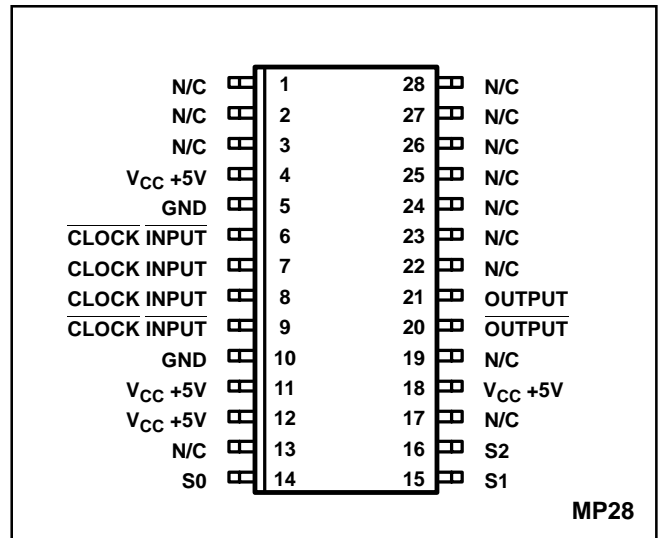


Fig.1 Pin connections - top view

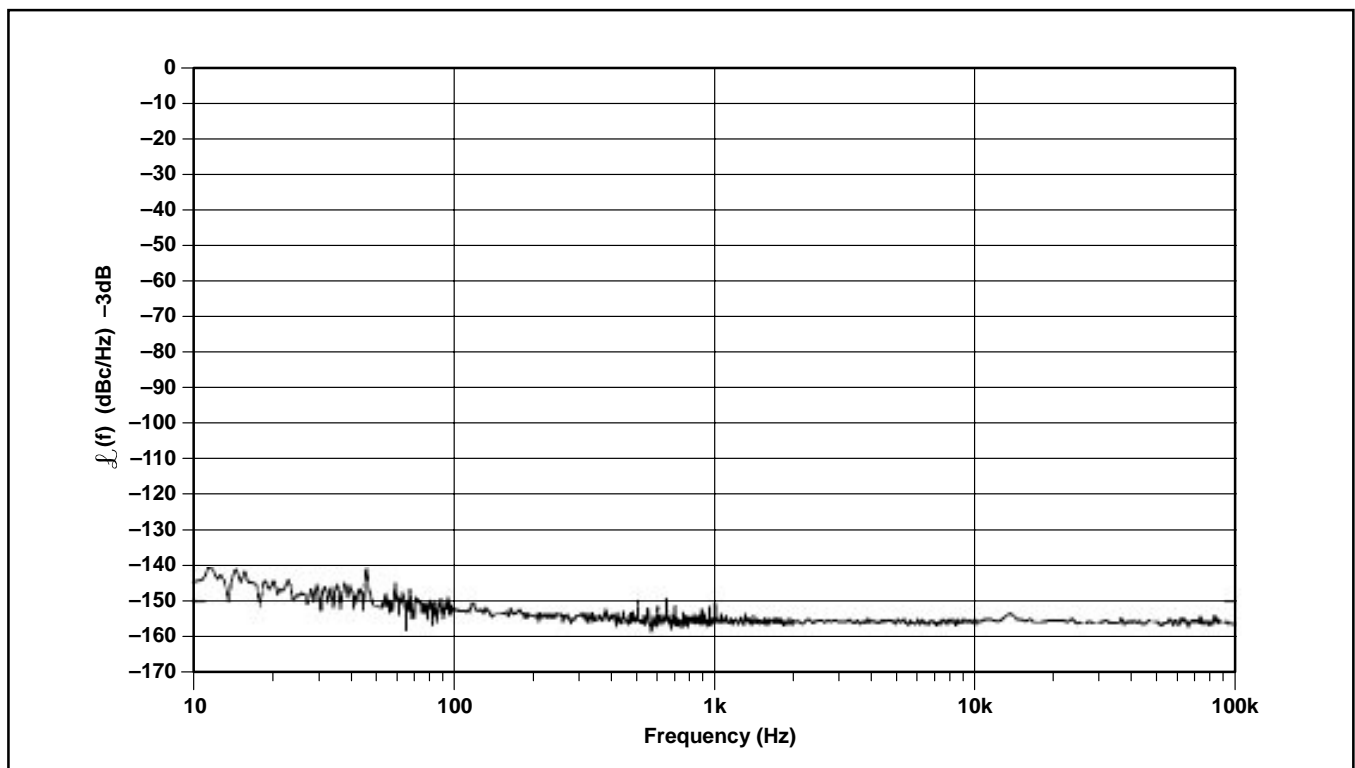


Fig.2 Typical single sideband phase noise measured at 768MHz

**ELECTRICAL CHARACTERISTICS**

Guaranteed over: Supply voltage  $V_{CC} = +4.75V$  to  $+5.25V$  Temperature  $T_{amb} = -10^{\circ}C$  to  $+75^{\circ}C$   
 Tested at  $+4.75V$  and  $+5.25V$  at  $T_{amb} = +25^{\circ}C$

Characteristic	Pin	Value			Units	Conditions
		Min.	Typ.	Max.		
Supply current	4, 11, 12, 18	82	92	102	mA	Output loaded with 300R See Fig.5 p-p @ 1.4GHz input ÷ 256 mode outputs loaded with 330R See Fig.5 RMS Sine wave into 50 Ohms (dBm equivalent) See Fig.3
Output voltage swing	20, 21	320	410		mV	
Input sensitivity 200MHz to 1.5GHz	7, 8			140 (-4)	mV dBm	
<b>Data Inputs</b>						
Logic high voltage		2.2			V	5V Data input voltage
Low low voltage				0.8	V	
Input current				180	$\mu A$	

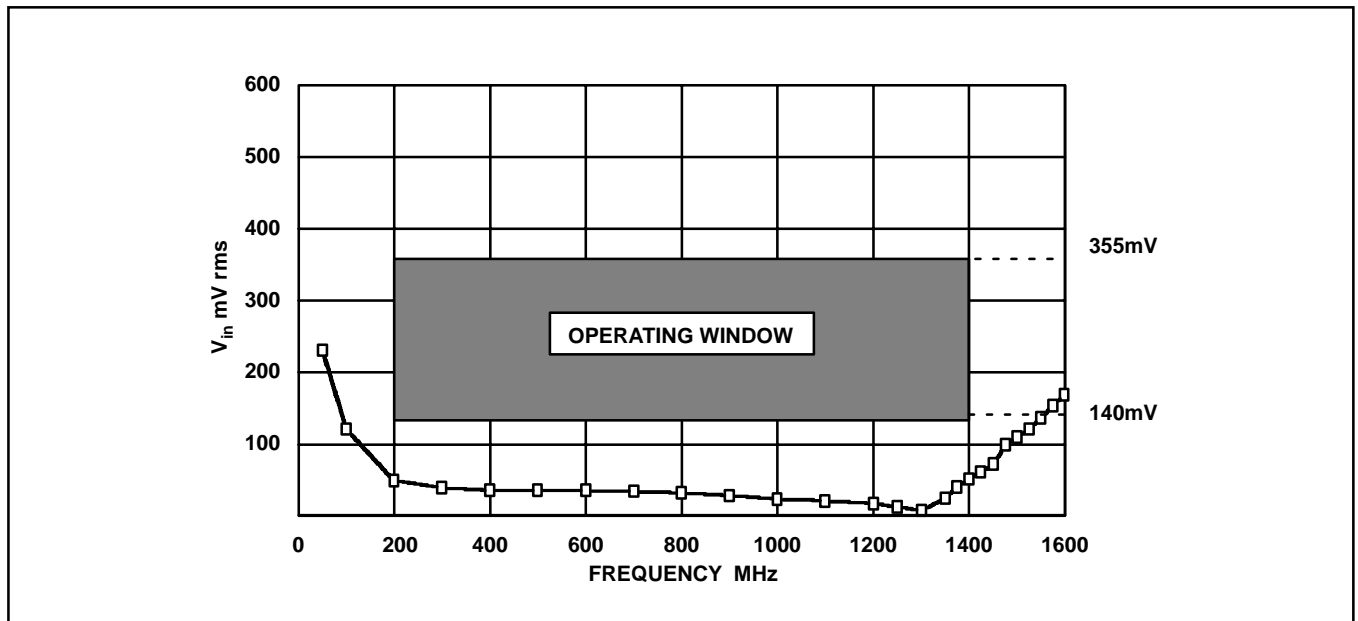


Fig.3 Typical input sensitivity

S0	S1	S2	DIVISION RATIO
L	L	L	2
H	L	L	4
L	H	L	8
H	H	L	16
L	L	H	32
H	L	H	64
L	H	H	128
H	H	H	256

Fig.4 Truth table

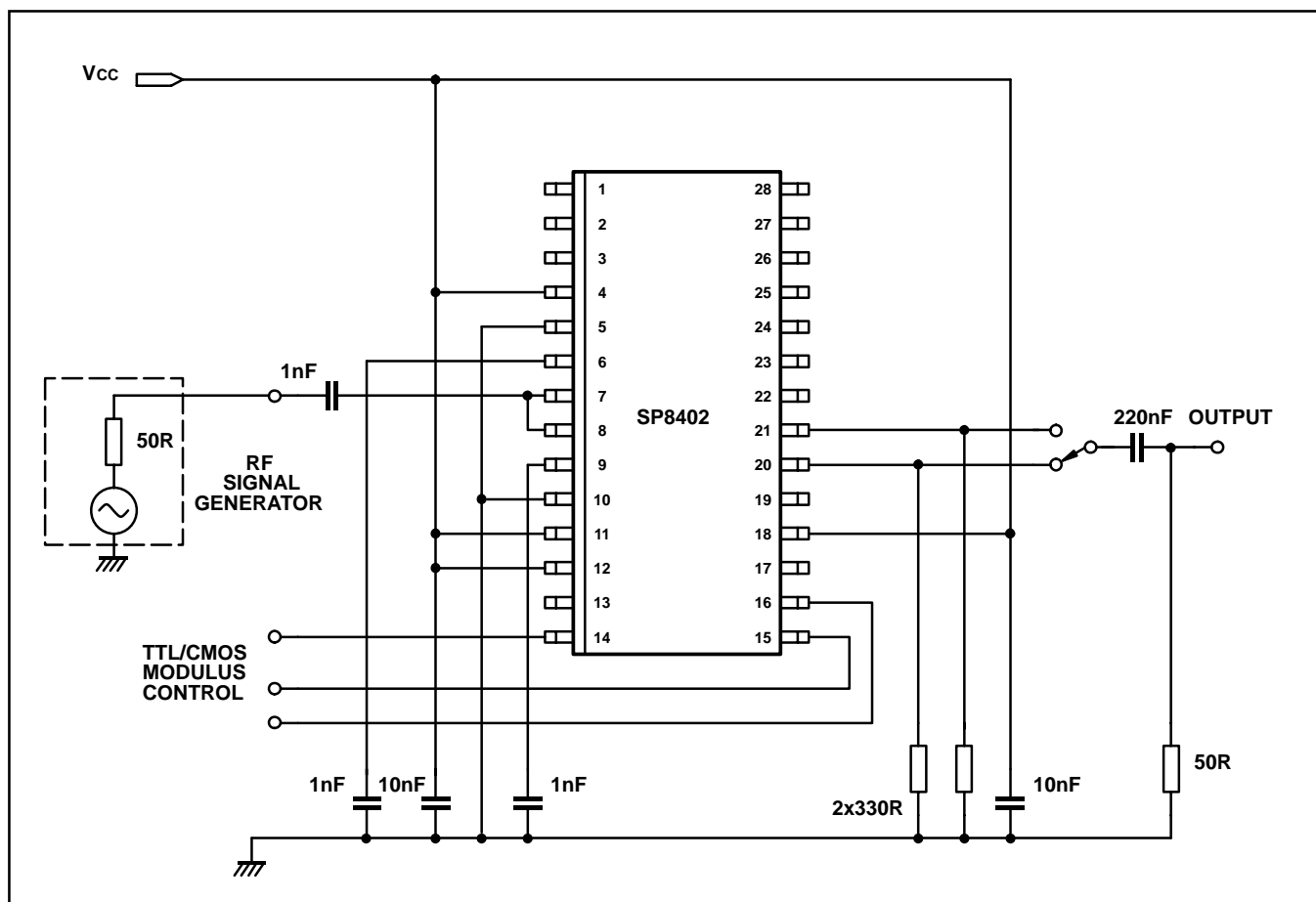


Fig.5 Test circuit

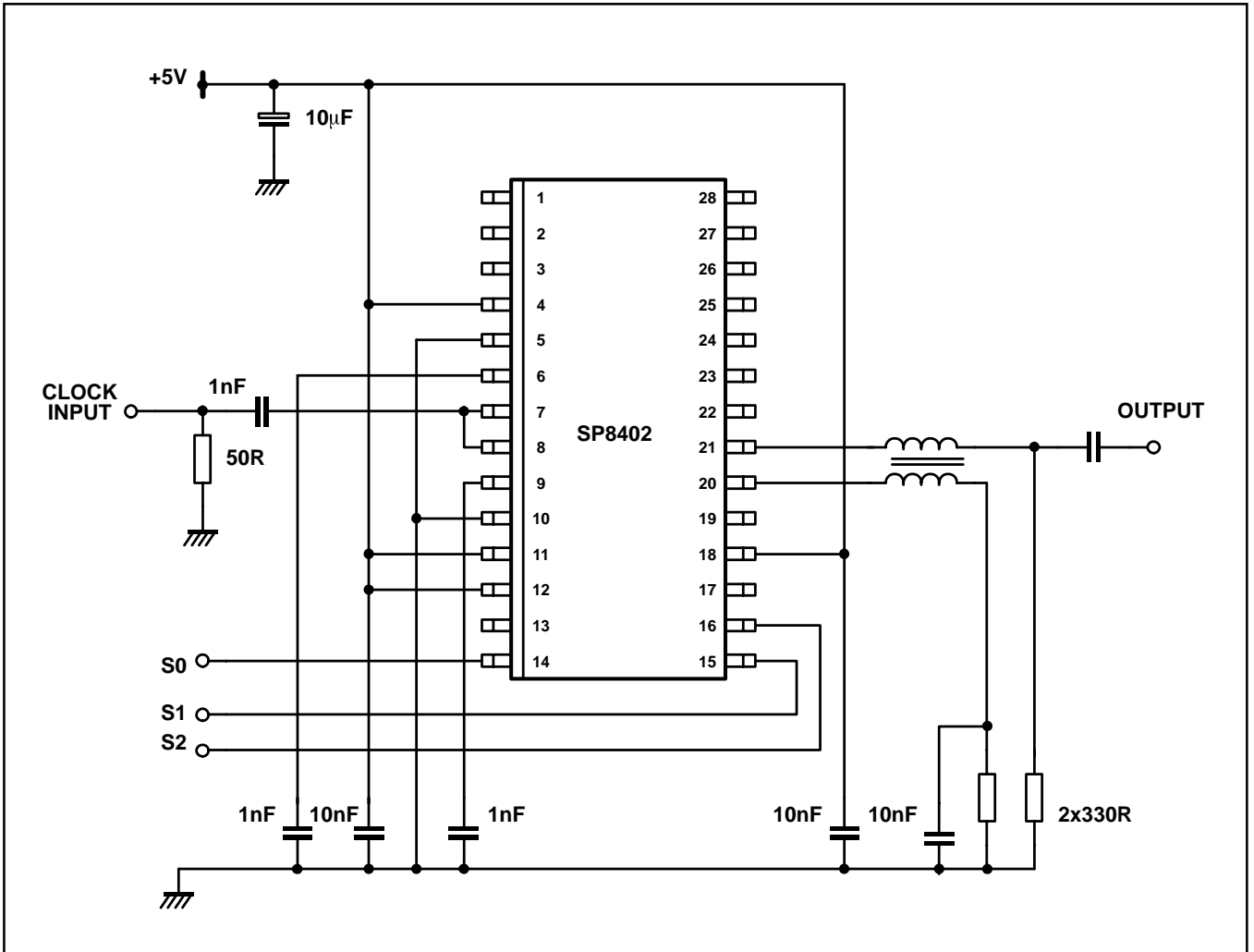
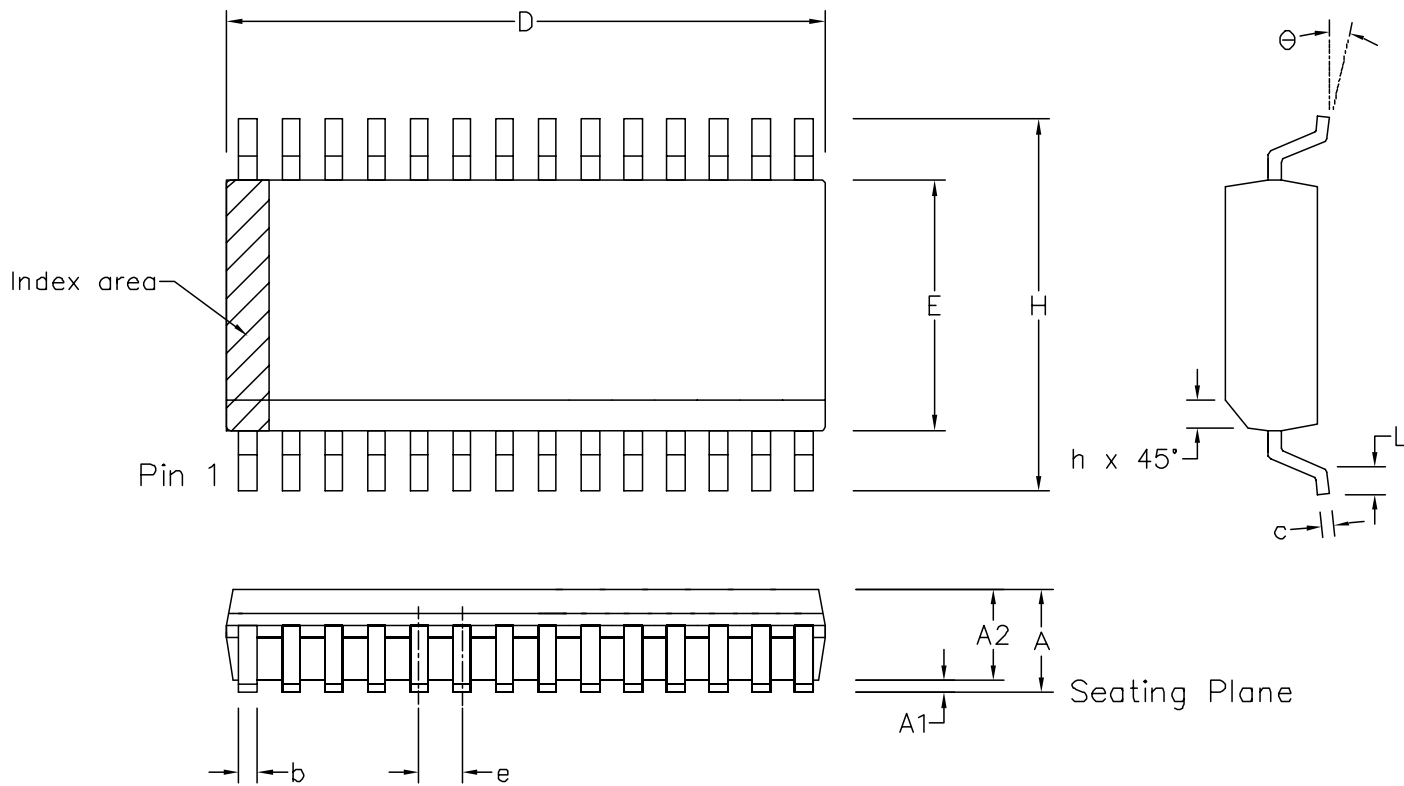


Fig.5 Typical application combining output to increase signal and retain low phase noise



Symbol	Control Dimensions in millimetres			Altern. Dimensions in inches		
	MIN	Nominal	MAX	MIN	Nominal	MAX
A	2.35		2.65	0.093		0.104
A1	0.10		0.30	0.004		0.012
A2	2.25		2.35	0.089		0.092
D	17.70		18.10	0.697		0.713
H	10.00		10.65	0.394		0.419
E	7.40		7.60	0.291		0.299
L	0.40		1.27	0.016		0.050
e	1.27 BSC.			0.050 BSC.		
b	0.33		0.51	0.013		0.020
c	0.23		0.32	0.009		0.013
$\ominus$	0°		8°	0°		8°
h	0.25		0.75	0.010		0.029
Pin features						
N	28					
Conforms to JEDEC MS-013AE Iss. C						

Notes:

1. The chamfer on the body is optional. If it not present, a visual index feature, e.g. a dot, must be located within the cross-hatched area.
2. Controlling dimension are in millimeters.
3. Dimension D do not include mould flash, protusion or gate burrs. These shall not exceed 0.006" per side.
4. Dimension E1 do not include inter-lead flash or protusion. These shall not exceed 0.010" per side.
5. Dimension b does not include dambar protusion/intrusion. Allowable dambar protusion shall be 0.004" total in excess of b dimension.

© Mitel						MITEL SEMICONDUCTOR
ISSUE	1	2				
ACN	006746	201943				
DATE	7APR95	27FEB97				
APPROVED						

ORIGINATING SITE: SWINDON
Title: Package Outline Drawing for 28 Ids SOIC(W)-0.300" Body Width (MP)
Drawing Number GPD00017



<http://www.mitelsemi.com>

**World Headquarters - Canada**

Tel: +1 (613) 592 2122  
Fax: +1 (613) 592 6909

**North America**

Tel: +1 (770) 486 0194  
Fax: +1 (770) 631 8213

**Asia/Pacific**

Tel: +65 333 6193  
Fax: +65 333 6192

**Europe, Middle East,  
and Africa (EMEA)**

Tel: +44 (0) 1793 518528  
Fax: +44 (0) 1793 518581

Information relating to products and services furnished herein by Mitel Corporation or its subsidiaries (collectively "Mitel") is believed to be reliable. However, Mitel assumes no liability for errors that may appear in this publication, or for liability otherwise arising from the application or use of any such information, product or service or for any infringement of patents or other intellectual property rights owned by third parties which may result from such application or use. Neither the supply of such information or purchase of product or service conveys any license, either express or implied, under patents or other intellectual property rights owned by Mitel or licensed from third parties by Mitel, whatsoever. Purchasers of products are also hereby notified that the use of product in certain ways or in combination with Mitel, or non-Mitel furnished goods or services may infringe patents or other intellectual property rights owned by Mitel.

This publication is issued to provide information only and (unless agreed by Mitel in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. The products, their specifications, services and other information appearing in this publication are subject to change by Mitel without notice. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. Manufacturing does not necessarily include testing of all functions or parameters. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to Mitel's conditions of sale which are available on request.

M Mitel (design) and ST-BUS are registered trademarks of MITEL Corporation  
Mitel Semiconductor is an ISO 9001 Registered Company  
Copyright 1999 MITEL Corporation  
All Rights Reserved  
Printed in CANADA

TECHNICAL DOCUMENTATION - NOT FOR RESALE