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ORDER OF DATA OUTPUT ON THE I²C BUS

Bit Order	EBU Numbering	Bit Value	VPS Equivalence
byte 1	bit 7	bit 0 - CNI b9	reserved [byte 11]
	bit 6	bit 1 - CNI b10	64 network (or programme provider)
	bit 5	bit 2 - PIL b1	16
	bit 4	bit 3 - PIL b2	8
	bit 3	byte 17 bit 0 - PIL b3	4 day
	bit 2	bit 1 - PIL b4	2
	bit 1	bit 2 - PIL b5	1
byte 2	bit 0	bit 3 - PIL b6	8
	bit 7	byte 18 bit 0 - PIL b7	4
	bit 6	bit 1 - PIL b8	2 month
	bit 5	bit 2 - PIL b9	1
	bit 4	bit 3 - PIL b10	16
	bit 3	byte 19 bit 0 - PIL b11	8
	bit 2	bit 1 - PIL b12	4 hour
byte 3	bit 1	bit 2 - PIL b13	2
	bit 0	bit 3 - PIL b14	1
	bit 7	byte 20 bit 0 - PIL b15	32
	bit 6	bit 1 - PIL b16	16
	bit 5	bit 2 - PIL b17	8
	bit 4	bit 3 - PIL b18	4 minute
	bit 3	byte 21 bit 0 - PIL b19	2
byte 4	bit 2	bit 1 - PIL b20	1
	bit 1	bit 2 - CNI b5	8
	bit 0	bit 3 - CNI b6	4
	bit 7	byte 22 bit 0 - CNI b7	2 country
	bit 6	bit 1 - CNI b8	1
	bit 5	bit 2 - CNI b11	32
	bit 4	bit 3 - CNI b12	16
byte 5	bit 3	byte 23 bit 0 - CNI b13	8 network (or programme provider)
	bit 2	bit 1 - CNI b14	4
	bit 1	bit 2 - CNI b15	2
	bit 0	bit 3 - CNI b16	1
	bit 7	byte 14 bit 0 - PCS b1	2 status (define the analog sound transmission system)
	bit 6	bit 1 - PCS b2	1
	bit 5	bit 2 - unallocated	
byte 6	bit 4	bit 3 - unallocated	
	bit 3	byte 15 bit 0 - CNI b1	128
	bit 2	bit 1 - CNI b2	64
	bit 1	bit 2 - CNI b3	32 country
	bit 0	bit 3 - CNI b4	16
	bit 7	byte 24 bit 0 - PTY b1	128
	bit 6	bit 1 - PTY b2	64
byte 7	bit 5	bit 2 - PTY b3	32
	bit 4	bit 3 - PTY b4	16 programme type
	bit 3	byte 25 bit 0 - PTY b5	8
	bit 2	bit 1 - PTY b6	4
	bit 1	bit 2 - PTY b7	2
	bit 0	bit 3 - PTY b8	1
	byte 7	bit 7	byte 13 bit 0 - LCI b1
bit 6		bit 1 - LCI b2	1 Interleave up to four PIL messages
bit 5		bit 2 - LUF	1 Label Update Flag (LUF)
bit 4		bit 3 - unallocated	
bit 3		-set to 1	
bit 2		-set to 1	
bit 1		-set to 1	
bit 0	-set to 1		

NOTE: Data is output on the I²C bus **MSB** first

MV1820

CRYSTAL SPECIFICATION

Parallel resonant fundamental frequency 27.750000MHz. AT cut.
 Tolerance at -10°C to 60°C ± 50ppm.
 Tolerance overall ± 100ppm.

Nominal load capacitance 20pF.
 Equivalent series resistance <20Ω.

FUNCTIONAL DESCRIPTION

The video signal is sliced to produce data and synchronising signals. Timing circuits monitor the sync signal to enable the MV1820 to lock onto the broadcast signal. A timing window, for the Vertical Blanking Interval (VBI) lines 6 - 22 and 318 - 335, is established to enable the acquisition circuit to monitor the sliced data signal for valid teletext data.

The framing code is checked for valid World System Teletext (WST) data. Magazine, packet and designation code bytes are checked and valid Broadcast Service Data Packets (BSDP) format two type only are accepted. These are known as packet 8/30. Format two is signalled by byte six, data bit two being set high and bits 3 and 4 set low. Bytes 13 to 25 inclusive are Hamming decoded (8,4) and stored in seven registers each of eight bits. If the complete message is correctly received with no uncorrectable Hamming errors, an interrupt to the microprocessor is signalled by the DAV (bar) pin going low. At the same time the data is transferred to a second bank of registers, reorganised with original numbered bytes 14, 15, 24, 25 and 13 placed after byte 23, to be read out on the I²C bus when so requested. Subsequent valid messages will continue to be transferred to the output registers overwriting any existing data. In this way the output registers always contain the latest PDC message.

The MV1820 is configured as an I²C bus slave transmitter with a selectable address. The I²C bus address is 0010 0001 (20 + 1 hex) with the address select (AS) pin set high, or 0010 0011 (22 + 1 hex) with the AS pin set low. The read bit (LSB) must always be set, it is not possible to write to the MV1820.

On recognising its address, the MV1820 will send an acknowledge and then transmit on the SDA line the first byte from the output registers (decoded byte 16 and 17) most

significant bit (MSB) first. It will then monitor the SDA line for an acknowledge from the microprocessor. If the microprocessor does NOT send an acknowledge, the MV1820 will release the data line to allow the microprocessor to send a stop condition. If the microprocessor does send an acknowledge, the following bytes of the message will be output provided each byte is acknowledged. The final data will be byte 13 followed by the four '1's.

When readout is complete, the DAV (bar) pin is reset high and the output registers are all set high. If the microprocessor continues to send clocks on the SCL line, the MV1820 will output FF bytes on the SDA line. Also, if the MV1820 is re-addressed before another PDC message is received, the MV1820 will output FF bytes on the SDA line. The microprocessor can prematurely stop the message by NOT sending an Acknowledge followed by a STOP condition after any byte has been sent by the MV1820. The registers will then be reset to FF bytes and the DAV pin will be reset high.

To prevent any corruption of the data in the output registers during I²C bus activity, valid PDC messages are held in the incoming registers until I²C bus activity ceases. Here they may be overwritten by new PDC messages until the I²C bus activity ceases and they can then be transferred to the output registers.

System clock is provided by an on - chip 27.75MHz oscillator together with an external parallel resonant fundamental frequency AT cut crystal.

Following a reset, RESET pulled low, the output I²C bus registers will contain FF bytes and the DAV pin will be set high. When the power supply is removed, the I²C bus will not be clamped to ground, leaving it free for other I²C bus traffic.

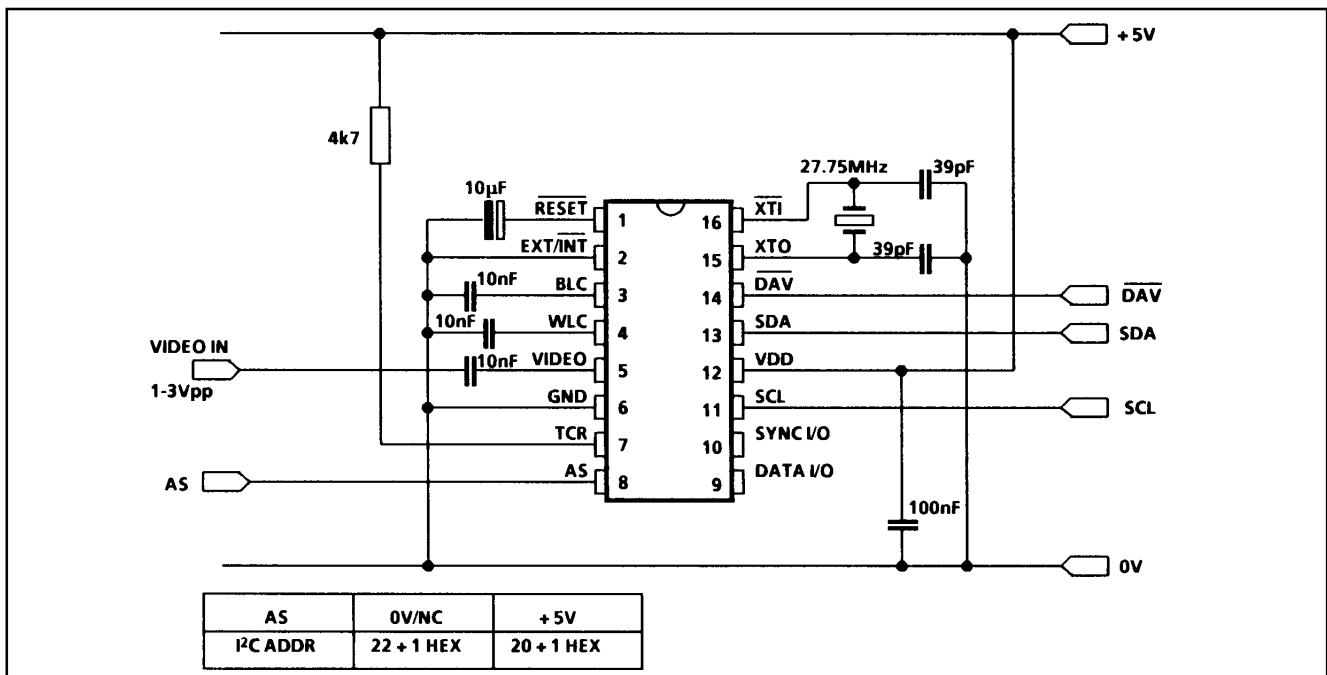


Fig.3 Typical application diagram

ELECTRICAL CHARACTERISTICS (continued)

These characteristics are guaranteed over the following conditions (unless otherwise stated)

$$T_{amb} = 0 \text{ to } 70^{\circ}\text{C}, V_{DD} = 5V \pm 10\%$$

Characteristic	Pin	Value			Units	Conditions
		Min	Typ	Max		
I2C bus						
SCL, SDA Schmitt inputs	11, 13					Not clamped when $V_{DD} = 0V$
Input voltage Low		0		1.5	V	
Input voltage High		3.5		V_{DD}	V	
Output voltage Low			0.1	0.4	V	$I_{OL} = 3.0mA$
SCL clock frequency	11		100	1000	kHz	
\overline{DAV} data available						100k (nom) pull-up resistor
Output voltage low			0.2	0.4	V	$I_{OH} = 2.4mA$
\overline{RESET} Schmitt input	1					100k (nom) pull-up resistor
Input voltage Low		0		0.8	V	
Input voltage High		$V_{DD}-1.0$		V_{DD}	V	
Input current Low		-22	-50	-220	μA	$V_{IN} = V_{SS}$
Input current High		-10		+10	μA	$V_{IN} = V_{DD}$

NOTE

Input voltage low and input voltage high for $\overline{EXT}/\overline{INT}$, AS and \overline{XTI} are as specified for DATA I/O.

PIN DESCRIPTION		
Symbol	Pin	Pin Name and Description
\overline{RESET}	1	Active Low Reset. Includes a 100k Ω pull - up resistor
$\overline{EXT}/\overline{INT}$	2	Control Pin for SYNC I/O and DATA I/O. Includes a 100k Ω pull - down resistor. When low or not connected, internal SYNC and DATA are used, pins 9 and 10 are outputs. When high, supply SYNC and DATA from an external source, pins 9 and 10 are inputs.
BLC	3	Black level capacitor.
WLC	4	White level capacitor.
VIDEO	5	Input for composite video signal with negative going syncs
GND	6	Ground 0 volts.
TCR	7	Time constant resistor. Controlling discharge rate of black and white level capacitor voltages.
AS	8	Address select for I²C bus. [0010 0001] with AS set high, or [0010 0011] with AS set low. Includes 100k Ω pull - down resistor.
DATA I/O	9	Data input/output.
SYNC I/O	10	Sync input/output.
SCL	11	I²C bus serial clock.
VDD	12	Positive supply voltage +5V \pm 10%
SDA	13	I²C bus bi-directional data port.
\overline{DAV}	14	Active low open drain output data available signal to microprocessor. Includes 100k Ω pull - up resistor
XTO	15	Crystal out, 27.75MHz fundamental crystal with on-chip 1M Ω resistor to \overline{XTI} .
\overline{XTI}	16	Crystal input.

MV1820

ELECTRICAL CHARACTERISTICS

These characteristics are guaranteed over the following conditions (unless otherwise stated)

$$T_{amb} = 0 \text{ to } 70^{\circ}\text{C}, V_{DD} = 5V \pm 10\%$$

Characteristic	Pin	Value			Units	Conditions
		Min	Typ	Max		
Supply voltage	12	4.5	5.0	5.5	V	
Supply current	12		20	25	mA	
Video input	5					
Video amplitude		0.8	1.8	3.0	V _{pp}	Bottom of sync to white (pk to pk)
Source impedance				250	Ω	
TCR input	7					
External resistance		4.7	4.7	200	kΩ	Connected to V _{DD}
BLC and WLC	3 & 4					
Capacitor value			10		nF	Connected to GND
Capacitor tolerance		-10%		+10%		
Effective series resistance				5	Ω	1MHz
DATA I/O and SYNC I/O	9 & 10					
Output voltage High		V _{DD} -1.0	4.5		V	I _{OH} = -1.2mA
Output voltage Low			0.2	0.4	V	I _{OL} = 2.4mA
Input voltage Low		0		0.8	V	
Input voltage High		V _{DD} -1.0		V _{DD}	V	
Input current		-30		+30	μA	V _{IN} = V _{SS} or V _{DD}
EXT/INT	2					100k (nom) pull-down resistor
Input voltage Low		0		0.8	V	
Input voltage High		V _{DD} -1.0		V _{DD}	V	
Input current Low		-10		+10	μA	V _{IN} = V _{SS}
Input current High		22	50	220	μA	V _{IN} = V _{DD}
AS	8					100k (nom) pull-down resistor
Input voltage Low		0		1.0	V	
Input voltage High		V _{DD} -1.0		V _{DD}	V	
Input current Low		-10		+10	μA	V _{IN} = V _{SS}
Input current High		22	50	220	μA	V _{IN} = V _{DD}
XTI Input	16					
Input current Low		-0.5	-5.0	-20	μA	-0.3 < V _{IN} < V _{IL} max
Input current High		0.5	5.0	20	μA	V _{IHmin} < V _{IN} < (V _{DD} + 0.3)
XTO Output	15					
Output voltage High		V _{DD} -1.0	4.5		V	I _{OH} = -1.0mA
Output voltage Low			0.2	0.4	V	I _{OL} = 2.0mA
Frequency			27.750		MHz	±100ppm

Video Programme Delivery Control Interface Circuit

Supersedes version in October 1995 Media IC Handbook, HB3120 - 3.0

DS3106 - 3.0 May 1996

The MV1820 is a high speed CMOS receiver for Programme Delivery Control (PDC) messages broadcast in World System Teletext (WST) Format Two Broadcast Service Data Packets (BSDP). The PDC message can be read on an I²C bus with data format similar to standard Video Programming Service (VPS) decoders. Additional data is appended to include new PDC features.

It is intended for use in Video Cassette Recorders to provide automatic recording of suitably labelled Television programmes requested by the user.

FEATURES

- On chip data slicing
- Low external component count
- I²C bus for low cost interfacing
- Advanced CMOS technology gives low power dissipation and high reliability

ABSOLUTE MAXIMUM RATINGS

Supply voltage	0.3V to 7V
All inputs	-0.3 to V _{DD} +0.3V
Operating temperature	0 to +70°C
Storage temperature	-55 to 125°C

ORDERING INFORMATION

MV1820F/CG/DPAS
MV1820F/CG/MPES

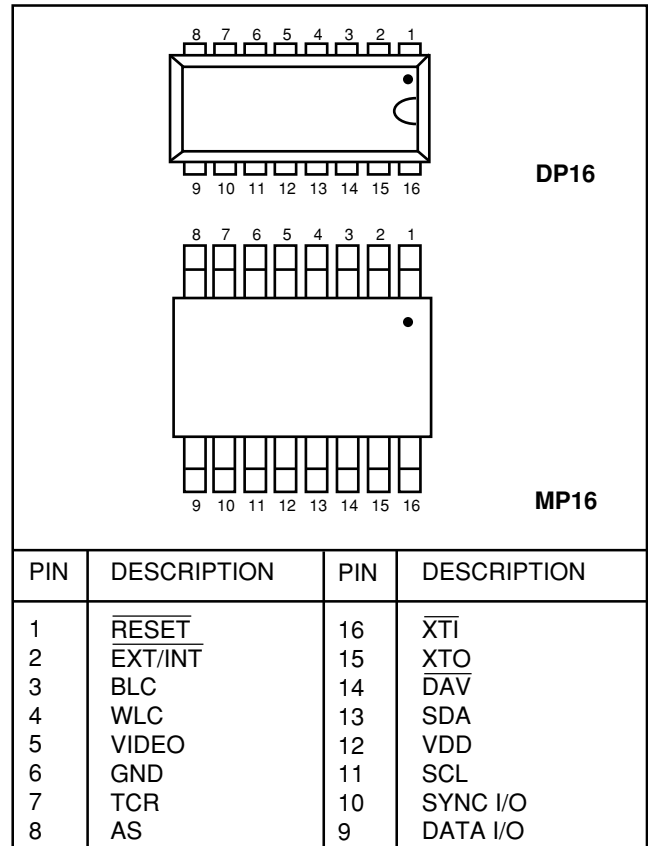


Fig.1 Pin connections - top view

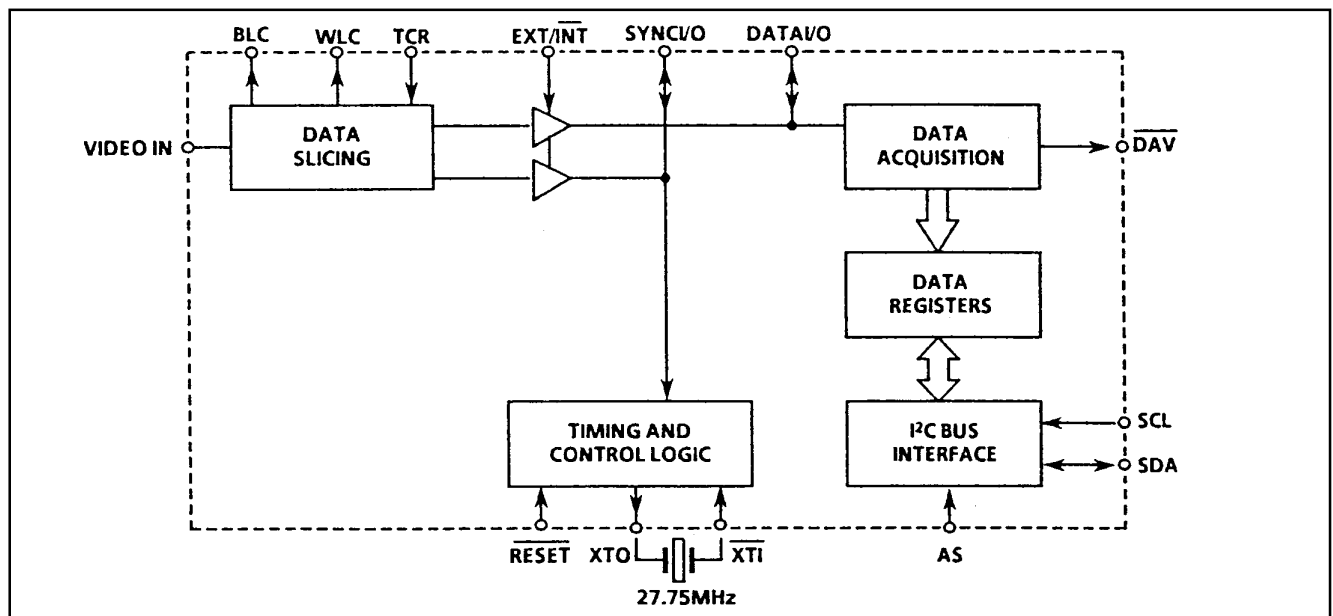
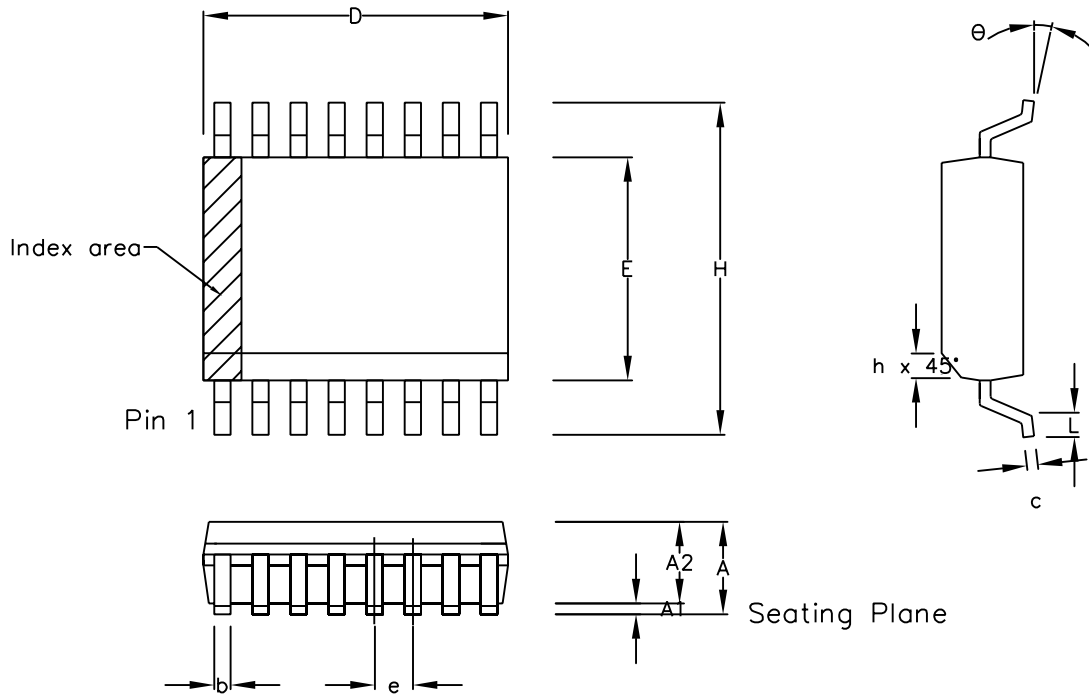


Fig.2 MV1820 block diagram



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	10.10		10.50	0.398		0.413
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
θ	0°		8°	0°		8°
h	0.25		0.75	0.010		0.029
Pin features						
N	16					
Conforms to JEDEC MS-013AA Iss. C						

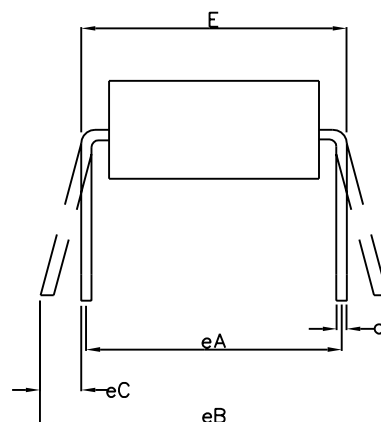
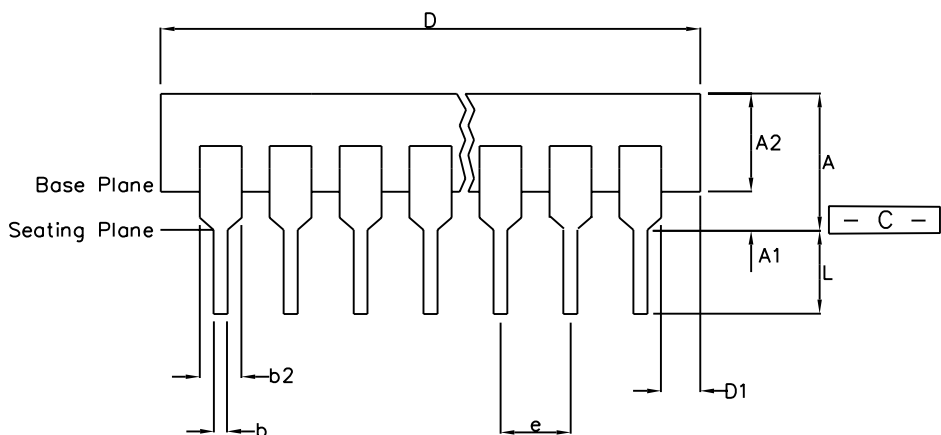
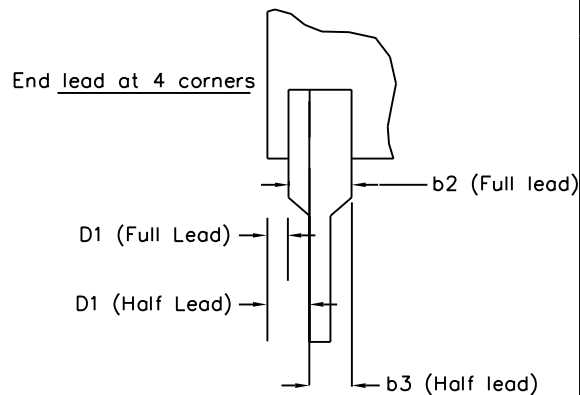
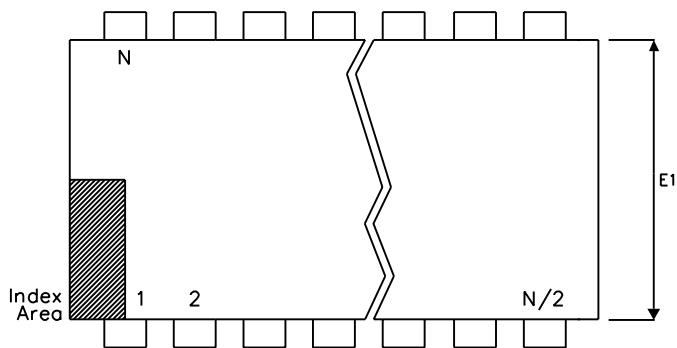
Notes:

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, protrusion or gate burrs. These shall not exceed 0.006" per side.
4. Dimension E1 do not include inter-lead flash or protrusion. These shall not exceed 0.010" per side.
5. Dimension b does not include dambar protrusion/intrusion. Allowable dambar protrusion shall be 0.004" total in excess of b dimension.

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ISSUE	1	2	3	
ACN	6745	201939	213097	
DATE	7Apr95	27Feb97	15Jul02	
APPRD.				



		Package Code	DC
Previous package codes		Package Outline for 16 lead SOIC (0.300" Body Width)	
MP / S			
		GPD00013	



	Min mm	Max mm	Min Inches	Max Inches
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	4.95	0.115	0.195
b	0.36	0.56	0.014	0.022
b2	1.14	1.78	0.045	0.070
b3	0.76	1.14	0.030	0.045
c	0.20	0.36	0.008	0.014
D	18.67	19.69	0.735	0.775
D1	0.13		0.005	
E	7.62	8.26	0.300	0.325
E1	6.10	7.11	0.240	0.280
e	2.54 BSC		0.100 BSC	
eA	7.62 BSC		0.300 BSC	
eB		10.92		0.430
eC	0.00	1.52	0.000	0.060
L	2.92	3.81	0.115	0.150
N	16		16	
Conforms to Jedec MS-001BB Issue D				

Notes:

1. Dimensions D, D1 & E1 do not include mould flash or protrusions.
2. Dimensions E & eA are measured with leads constrained to be perpendicular to datum $- C -$
3. Dimensions eB & eC are measured with the leads unconstrained
4. Controlling dimensions are Inches. Millimeter conversions are not necessarily exact.
5. N is the maximum of terminal positions.

This drawing supersedes: -
UK drawing # 418/ED/39502/003

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APPRD.			



Previous package codes	DP / E
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Package Code	DA
Package Outline for 16 lead PDIP	
GPD00346	



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