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ORDER OF DATA OUTPUT ON THE I<sup>2</sup>C BUS

Bit Order	EBU Numbering	Bit Value	VPS Equivalence
byte 1 bit 7	byte 16 bit 0 - CNI b9	_____ reserved	[byte 11
bit 6	bit 1 - CNI b10	64	
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	
bit 0	bit 3 - PIL b6	8	[
byte 2 bit 7	byte 18 bit 0 - PIL b7	4	[ byte 12
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	
bit 1	bit 2 - PIL b13	2	
bit 0	bit 3 - PIL b14	1	[
byte 3 bit 7	byte 20 bit 0 - PIL b15	32	[ byte 13
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	
bit 2	bit 1 - PIL b20	1	
bit 1	bit 2 - CNI b5	8	
bit 0	bit 3 - CNI b6	4	[
byte 4 bit 7	byte 22 bit 0 - CNI b7	2 country	[ byte 14
bit 6	bit 1 - CNI b8	1	
bit 5	bit 2 - CNI b11	32	
bit 4	bit 3 - CNI b12	16	
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	[
byte 5 bit 7	byte 14 bit 0 - PCS b1	2 status (define the analog sound	[ byte 5
bit 6	bit 1 - PCS b2	1 transmission system)	
bit 5	bit 2 - unallocated	128	
bit 4	bit 3 - unallocated	64	
bit 3	byte 15 bit 0 - CNI b1	32 country	
bit 2	bit 1 - CNI b2	16	[
bit 1	bit 2 - CNI b3	128	[ byte 15
bit 0	bit 3 - CNI b4	64	
byte 6 bit 7	byte 24 bit 0 - PTY b1	32	
bit 6	bit 1 - PTY b2	16 programme type	
bit 5	bit 2 - PTY b3	8	
bit 4	bit 3 - PTY b4	4	
bit 3	byte 25 bit 0 - PTY b5	2	
bit 2	bit 1 - PTY b6	1	[
bit 1	bit 2 - PTY b7	2 Label Channel Identifier	
bit 0	bit 3 - PTY b8	1 Interleave up to four PIL messages	
byte 7 bit 7	byte 13 bit 0 - LCI b1	1 Label Update Flag (LUF)	
bit 6	bit 1 - LCI b2		
bit 5	bit 2 - 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  
I<sup>2</sup>C bus **MSB** first

## CRYSTAL SPECIFICATION

Parallel resonant fundamental frequency 27.75000MHz. AT cut.  
Tolerance at -10°C to 60°C  $\pm$  50ppm.  
Tolerance overall  $\pm$  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 I<sup>2</sup>C 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 I<sup>2</sup>C bus slave transmitter with a selectable address. The I<sup>2</sup>C 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 I<sup>2</sup>C bus activity, valid PDC messages are held in the incoming registers until I<sup>2</sup>C bus activity ceases. Here they may be overwritten by new PDC messages until the I<sup>2</sup>C 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 I<sup>2</sup>C bus registers will contain FF bytes and the **DAV** pin will be set high. When the power supply is removed, the I<sup>2</sup>C bus will not be clamped to ground, leaving it free for other I<sup>2</sup>C bus traffic.

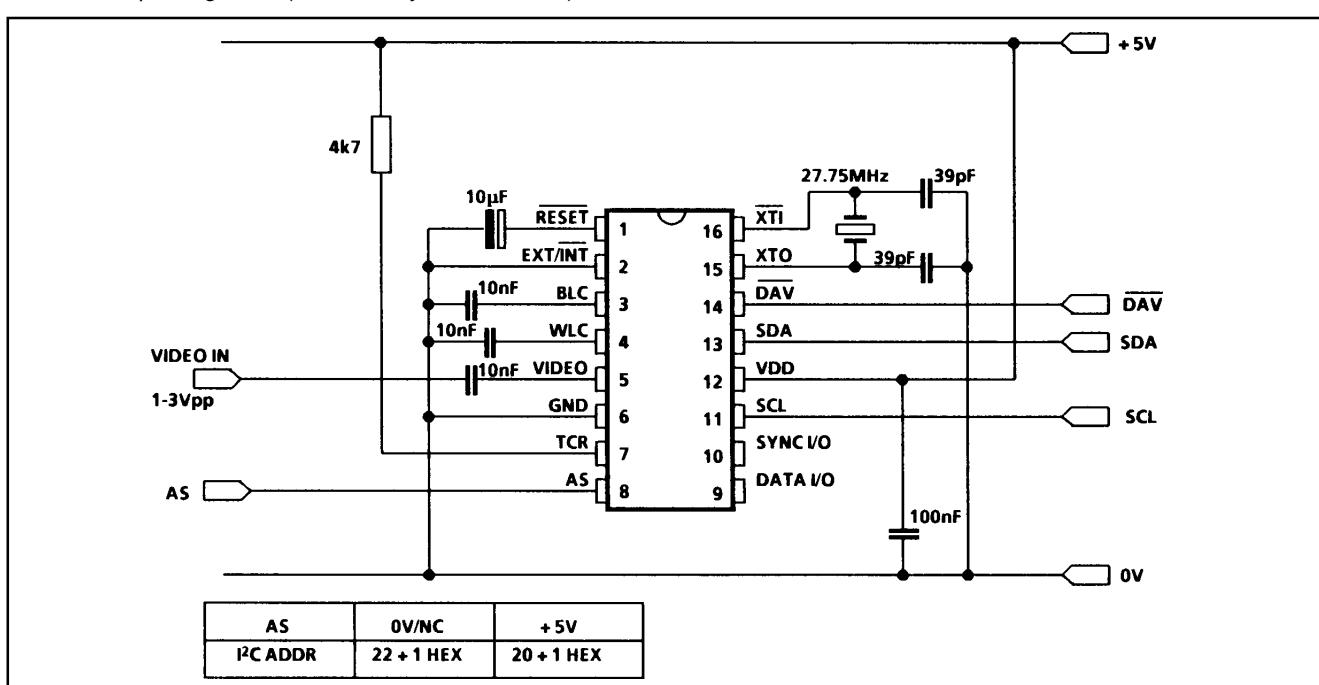


Fig.3 Typical application diagram

**ELECTRICAL CHARACTERISTICS (continued)**

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

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

Characteristic	Pin	Value			Units	Conditions
		Min	Typ	Max		
I <sup>2</sup> C bus						
SCL, SDA Schmitt inputs	11, 13					Not clamped when $V_{DD} = 0\text{V}$
Input voltage Low		0		1.5	V	
Input voltage High		3.5		$V_{DD}$	V	
Output voltage Low			0.1	0.4	V	$I_{OL} = 3.0\text{mA}$
SCL clock frequency	11		100	1000	kHz	
DAV data available						100k (nom) pull-up resistor
Output voltage low			0.2	0.4	V	$I_{OH} = 2.4\text{mA}$
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	$\mu\text{A}$	$V_{IN} = V_{SS}$
Input current High		-10		+10	$\mu\text{A}$	$V_{IN} = V_{DD}$

## NOTE

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

PIN DESCRIPTION Symbol	Pin	Pin Name and Description
RESET	1	<b>Active Low Reset.</b> Includes a 100k $\Omega$ pull - up resistor
EXT/INT	2	<b>Control Pin for SYNC I/O and DATA I/O.</b> Includes a 100k $\Omega$ 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	<b>Black level capacitor.</b>
WLC	4	<b>White level capacitor.</b>
VIDEO	5	<b>Input for composite video signal with negative going syncs</b>
GND	6	<b>Ground 0 volts.</b>
TCR	7	<b>Time constant resistor.</b> Controlling discharge rate of black and white level capacitor voltages.
AS	8	<b>Address select for I<sup>2</sup>C bus.</b> [0010 0001] with AS set high, or [0010 0011] with AS set low. Includes 100k $\Omega$ pull - down resistor.
DATA I/O	9	<b>Data input/output.</b>
SYNC I/O	10	<b>Sync input/output.</b>
SCL	11	<b>I<sup>2</sup>C bus serial clock.</b>
VDD	12	<b>Positive supply voltage +5V <math>\pm 10\%</math></b>
SDA	13	<b>I<sup>2</sup>C bus bi-directional data port.</b>
DAV	14	<b>Active low open drain output data available signal to microprocessor.</b> Includes 100k $\Omega$ pull - up resistor
XTO	15	<b>Crystal out,</b> 27.75MHz fundamental crystal with on-chip 1M $\Omega$ resistor to XTI.
XTI	16	<b>Crystal input.</b>

## 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 <sub>pp</sub>	Bottom of sync to white (pk to pk)
Source impedance				250	$\Omega$	
TCR input	7					
External resistance		4.7	4.7	200	k $\Omega$	Connected to $V_{DD}$
BLC and WLC	3 & 4					
Capacitor value			10		nF	Connected to GND
Capacitor tolerance		-10%		+10%		
Effective series resistance				5	$\Omega$	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	$\mu A$	$V_{IN} = V_{SS}$ 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	$\mu A$	$V_{IN} = V_{SS}$
Input current High		22	50	220	$\mu A$	$V_{IN} = V_{DD}$
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	$\mu A$	$V_{IN} = V_{SS}$
Input current High		22	50	220	$\mu A$	$V_{IN} = V_{DD}$
XTI Input	16					
Input current Low		-0.5	-5.0	-20	$\mu A$	$-0.3 < V_{IN} < V_{IL\ max}$
Input current High		0.5	5.0	20	$\mu A$	$V_{IH\ min} < V_{IN} < (V_{DD} + 0.3)$
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	$\pm 100ppm$

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 I<sup>2</sup>C 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
- I<sup>2</sup>C 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 <sub>DD</sub> +0.3V
Operating temperature	0 to +70°C
Storage temperature	-55 to 125°C

## ORDERING INFORMATION

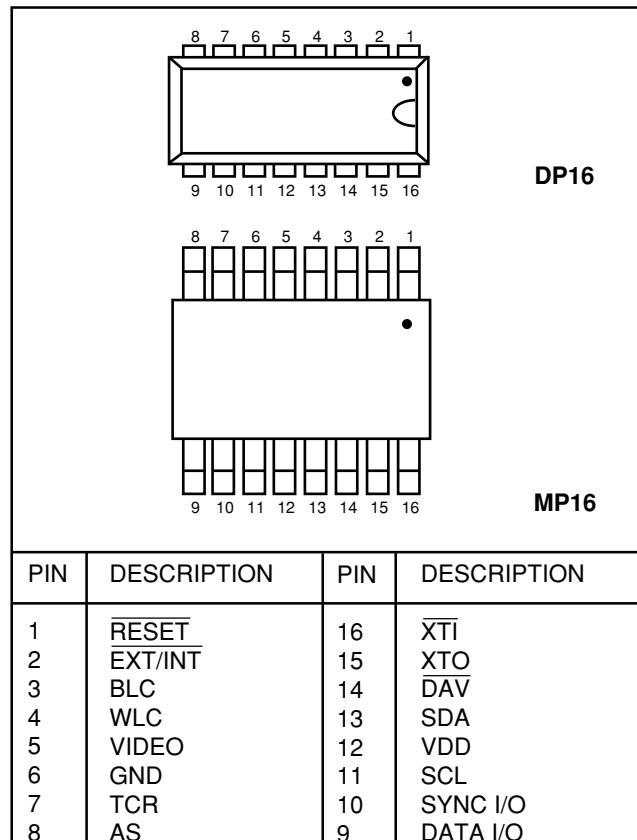
 MV1820F/CG/DPAS  
 MV1820F/CG/MPES


Fig.1 Pin connections - top view

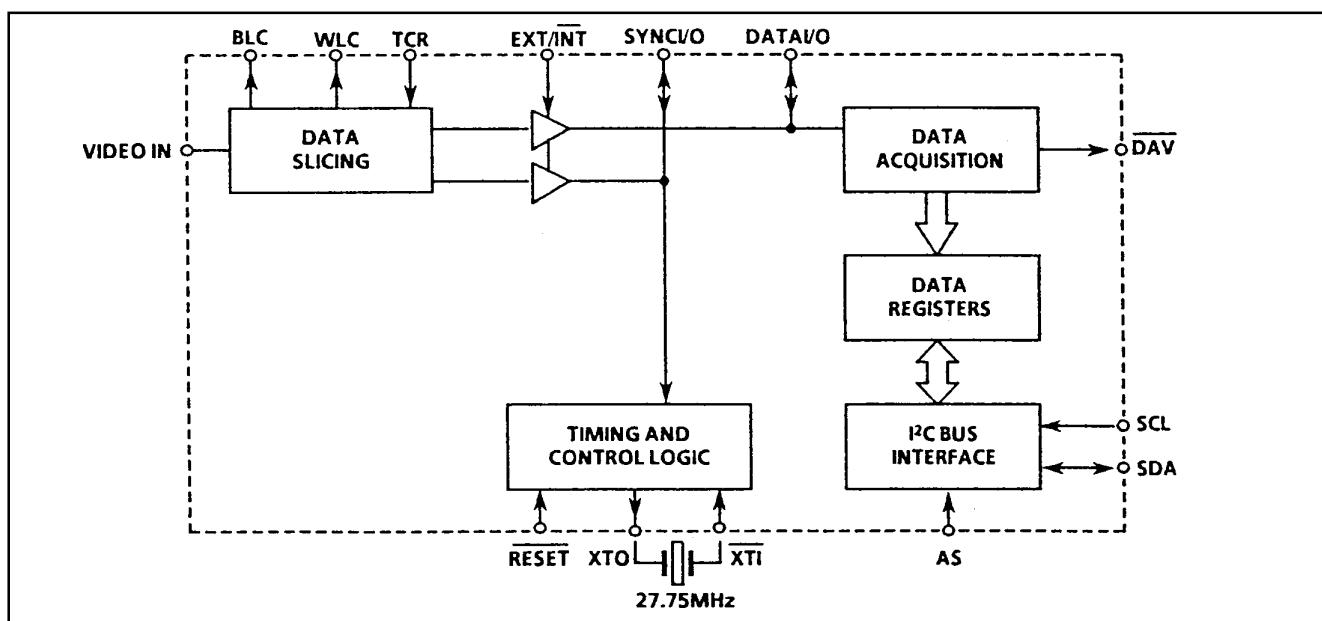
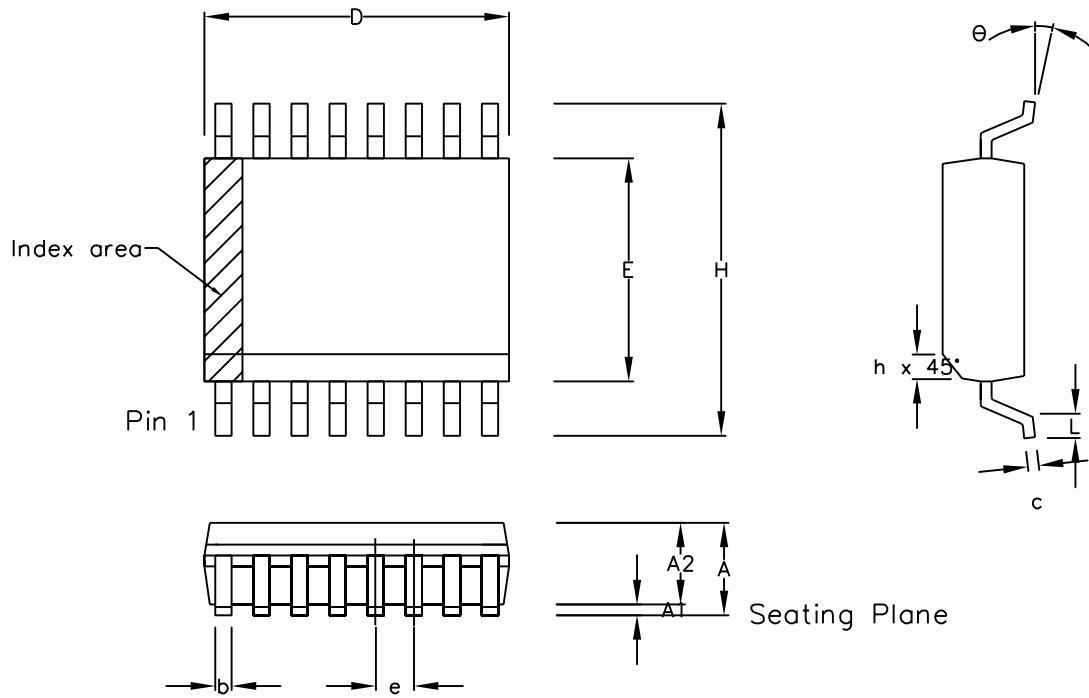


Fig.2 MV1820 block diagram



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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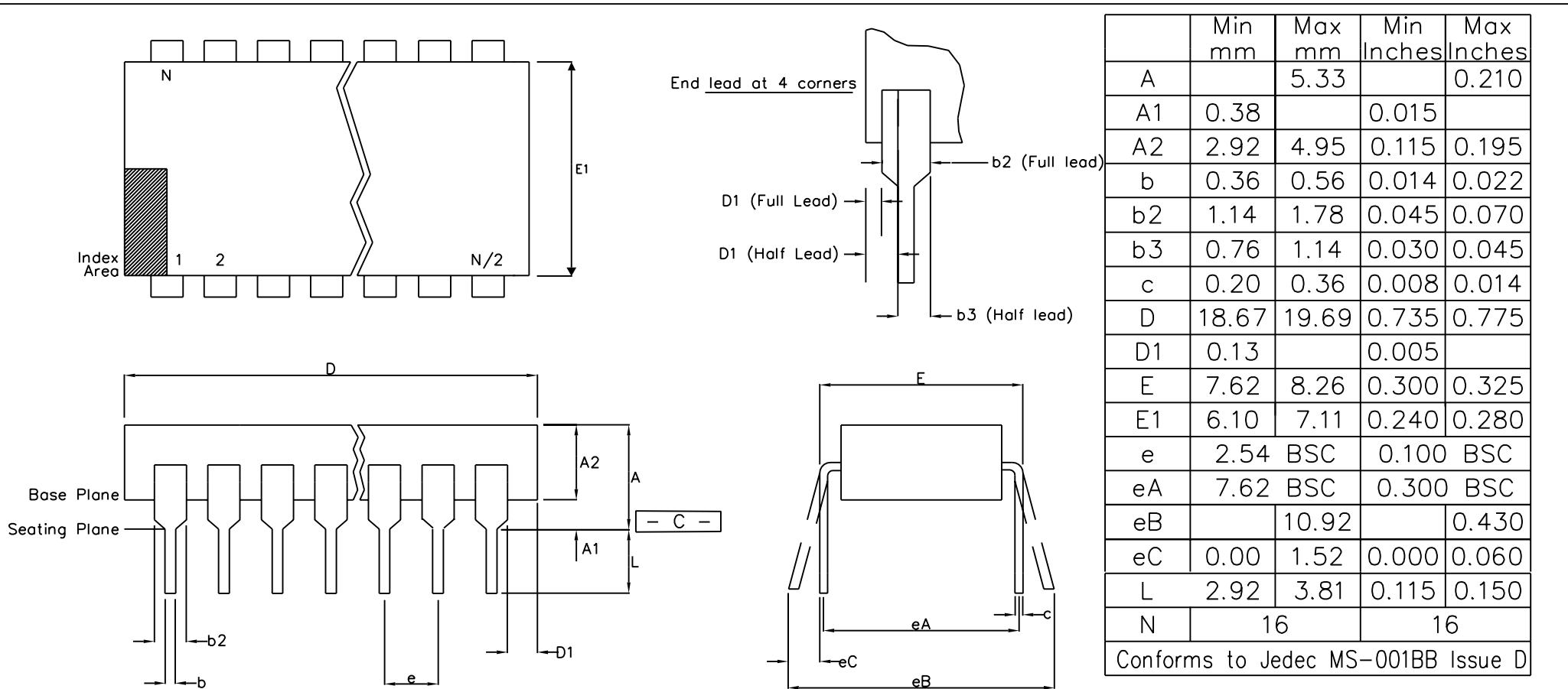
Previous package codes

MP / S

Package Code DC

Package Outline for  
16 lead SOIC  
(0.300" Body Width)

GPD00013



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

Package Code DA

Package Outline for  
16 lead PDIP

GPD00346



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