

**BUS-CONTROLLED VIDEO MATRIX SWITCH**

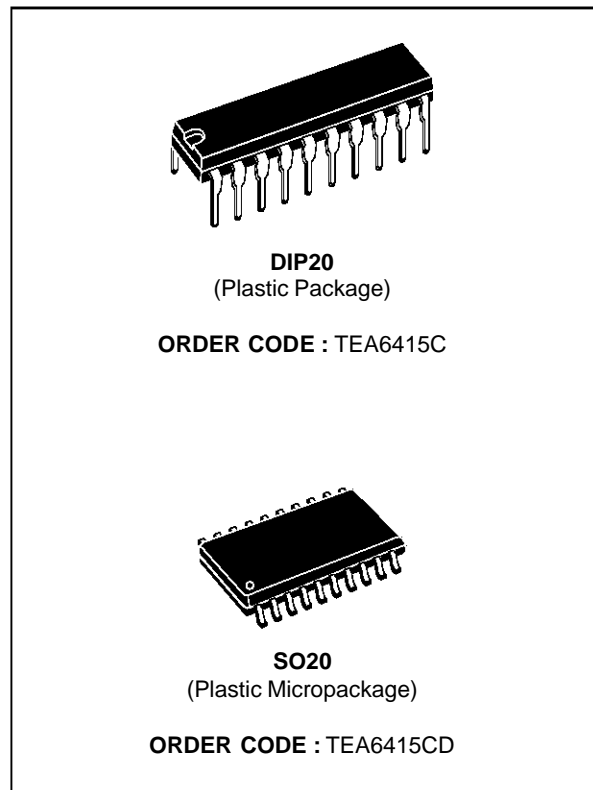
- 20MHz BANDWIDTH
- CASCADABLE WITH ANOTHER TEA6415C (INTERNAL ADDRESS CAN BE CHANGED BY PIN 7 VOLTAGE)
- 8 INPUTS (CVBS, RGB, MAC, CHROMA, ...)
- 6 OUTPUTS
- POSSIBILITY OF MAC OR CHROMA SIGNAL FOR EACH INPUT BY SWITCHING-OFF THE CLAMP WITH AN EXTERNAL RESISTOR BRIDGE
- BUS CONTROLLED
- 6.5dB GAIN BETWEEN ANY INPUT AND OUTPUT
- -55dB CROSSTALK AT 5MHz
- FULLY ESD PROTECTED

**DESCRIPTION**

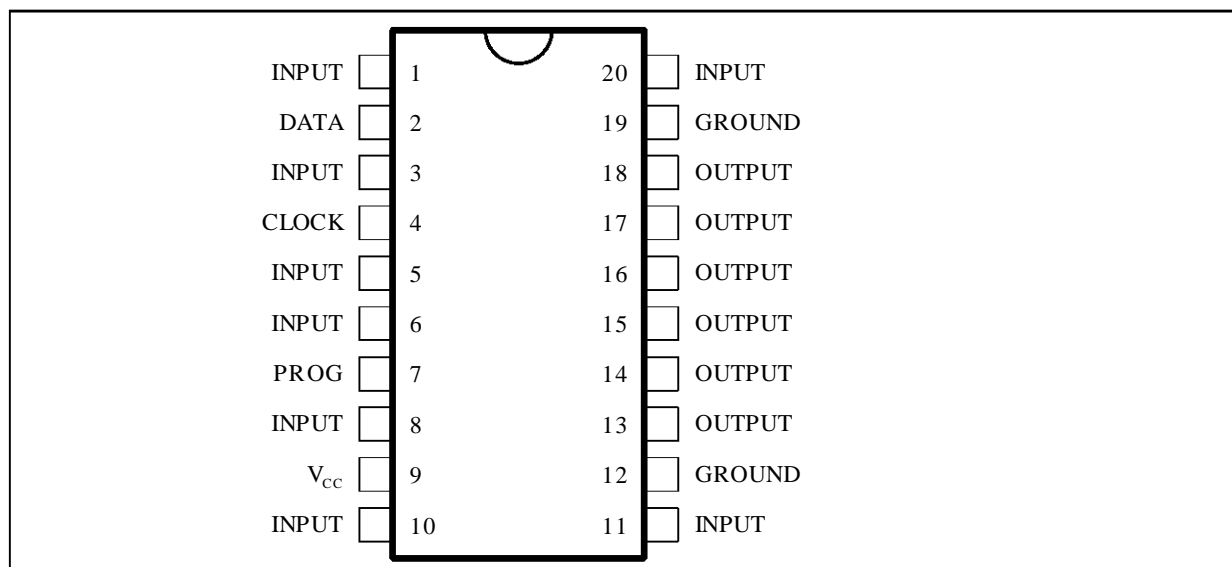
The main function of the TEA6415C is to switch 8 video input sources on the 6 outputs.

Each output can be switched to only one of the inputs whereas but any same input may be connected to several outputs.

All the switching possibilities are controlled through the I<sup>2</sup>C bus.

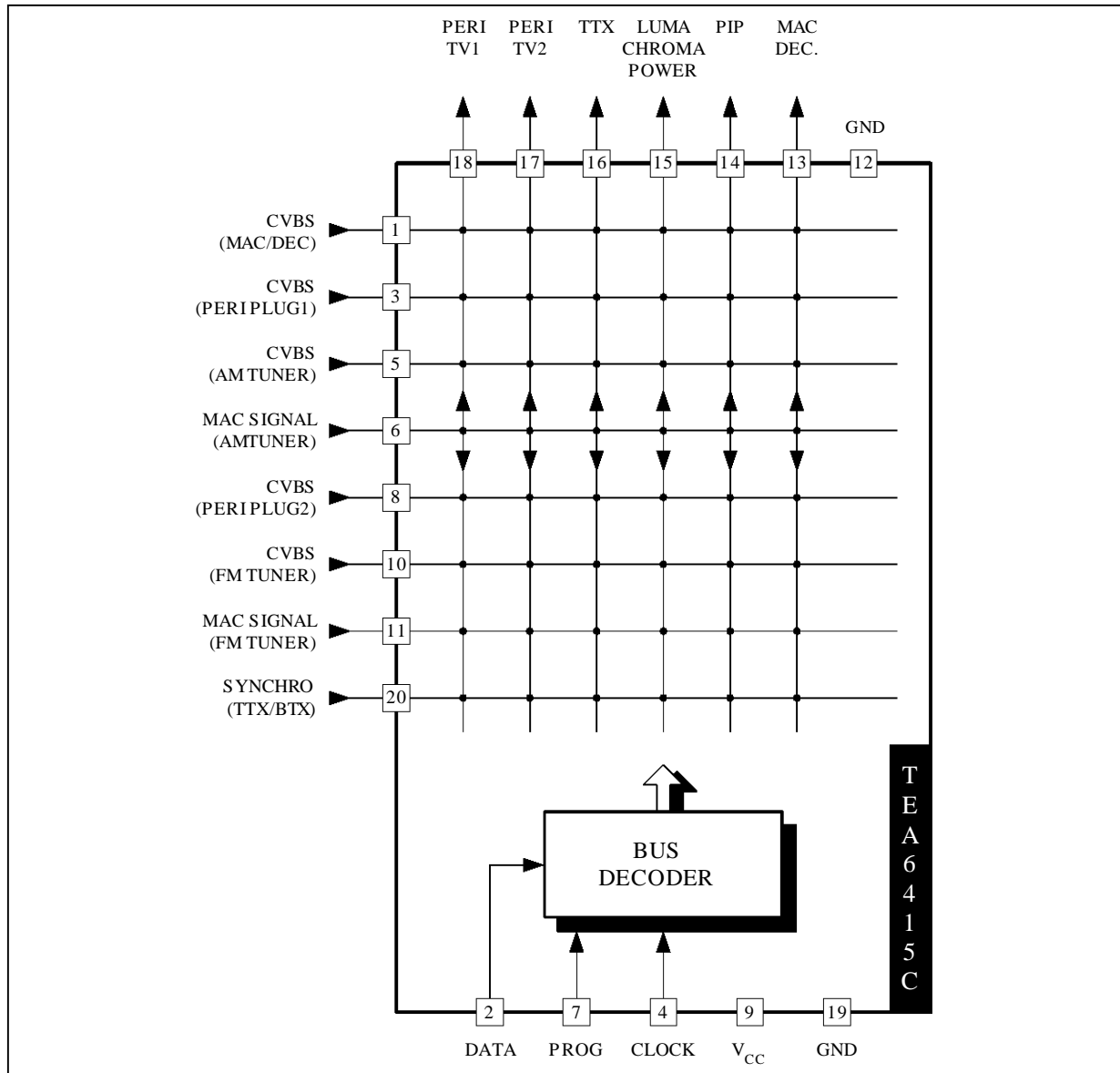


**PIN CONNECTIONS**



6415C-01/EPS

**BLOCK DIAGRAM**



6415C-02.EPS

**GENERAL DESCRIPTION**

The main function of the IC is to switch 8 video input sources on 6 outputs.

Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of synch. top for CVBS or black level for RGB signals).

Each nominal gain between any input and output is 6.5dB. For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5 V<sub>DC</sub> on the input. Each input can be used as a normal input or as a MAC or Chroma

input (with external resistor bridge). All the switching possibilities are changed through the BUS.

Driving 75Ω load needs an external transistor.

It is possible to have the same input connected to several outputs.

The starting configuration upon power on (power supply : 0 to 10V) is undetermined.

In this case, 6 words of 16 bits are necessary to determine one configuration. In other case, 1 word of 16 bits is necessary to determine one configuration.

**ABSOLUTE MAXIMUM RATINGS**

| Symbol           | Parameter                     | Value      | Unit |
|------------------|-------------------------------|------------|------|
| V <sub>CC</sub>  | Supply Voltage (Pin 9)        | 12         | V    |
| T <sub>A</sub>   | Operating Ambient Temperature | 0, +70     | °C   |
| T <sub>stg</sub> | Storage Temperature           | - 20, +150 | °C   |

6415C-01.TBL

**THERMAL DATA**

| Symbol               | Parameter                           | Value     | Unit         |
|----------------------|-------------------------------------|-----------|--------------|
| R <sub>th(j-a)</sub> | Junction-Ambient Thermal Resistance | 80<br>100 | °C/W<br>°C/W |

6415C-02.TBL

**ELECTRICAL CHARACTERISTICS**

T<sub>A</sub> = 25°C , V<sub>CC</sub> = 10V , R<sub>LOAD</sub> = 10kΩ , C<sub>LOAD</sub> = 3pF (unless otherwise specified)

| Symbol          | Parameter  | Min. | Typ. | Max. | Unit |
|-----------------|--|------|------|------|------|
| V <sub>CC</sub> | Supply Voltage (Pin 9)   | 8    | 10   | 11   | V    |
| I <sub>CC</sub> | Power Supply Current (without load on outputs ; V <sub>CC</sub> = 10V) | 20   | 30   | 40   | mA   |

**INPUTS**

|  |   |     |     |     |                 |
|--|---|-----|-----|-----|-----------------|
|  | Signal Amplitude (CVBS signal)  |     |     | 2   | V <sub>PP</sub> |
|  | Input Current (per output connected, input voltage = 5V <sub>DC</sub> )<br>(this current is X6 when all outputs are connected on the input) |     | 1   | 3   | μA              |
|  | DC Level  | 3.3 | 3.6 | 3.9 | V               |
|  | DC Level Shift (temperature from 0 to 70°C)   |     | 5   | 100 | mV              |

**OUTPUTS (V<sub>IN</sub> = 1V<sub>PP</sub> for all dynamic tests) Pins 13 - 14 - 15 - 16 - 17 - 18**

|  |   |     |              |              |                 |
|--|---|-----|--------------|--------------|-----------------|
|  | Dynamic   | 4.5 | 5.5          |              | V <sub>PP</sub> |
|  | Output Impedance                                  |     | 25           | 50           | Ω               |
|  | Gain  | 6   | 6.5          | 7            | dB              |
|  | Bandwidth<br>-1dB attenuation<br>-3dB attenuation | 7   | 15<br>20     |              | MHz<br>MHz      |
|  | Crosstalk<br>f = 5MHz<br>f = 3.58MHz              |     | - 55<br>- 60 | - 45<br>- 50 | dB<br>dB        |
|  | DC level  | 2.4 | 2.75         | 3.1          | V               |

6415C-03.TBL

**I<sup>2</sup>C BUS CHARACTERISTICS**

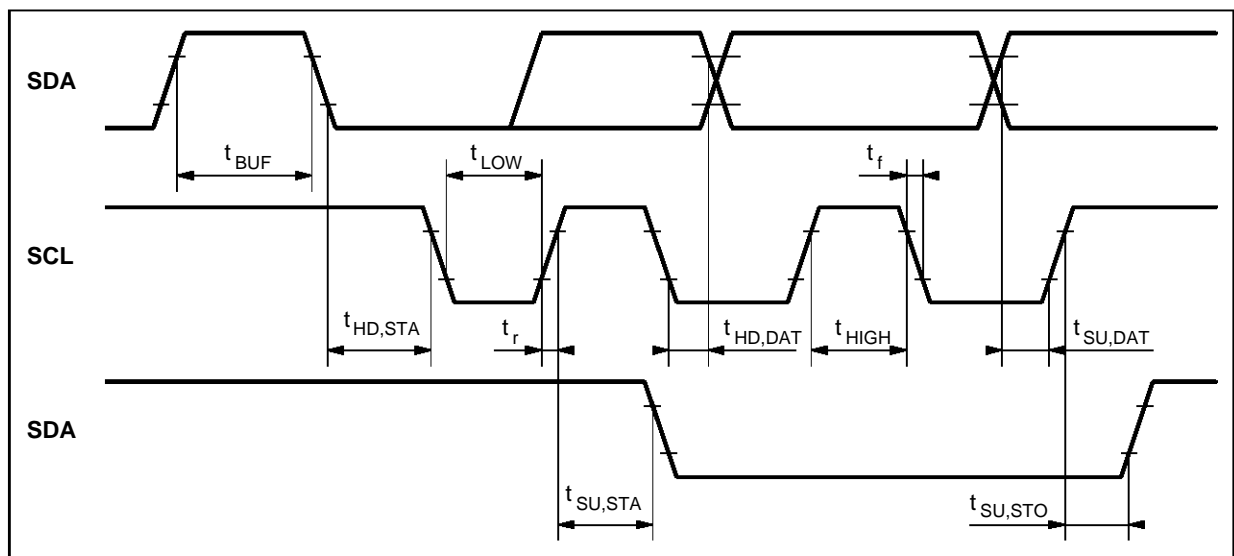
| Symbol           | Parameter                | Test Conditions                       | Min.  | Max.                  | Unit |
|------------------|--------------------------|---------------------------------------|-------|-----------------------|------|
| SCL              |                          |                                       |       |                       |      |
| V <sub>IL</sub>  | Low Level Input Voltage  |                                       | - 0.3 | + 1.5                 | V    |
| V <sub>IH</sub>  | High Level Input Voltage |                                       | 3.0   | V <sub>CC</sub> + 0.5 | V    |
| I <sub>LI</sub>  | Input Leakage Current    | V <sub>I</sub> = 0 to V <sub>CC</sub> | - 10  | + 10                  | μA   |
| f <sub>SCL</sub> | Clock Frequency          |                                       | 0     | 100                   | kHz  |
| t <sub>R</sub>   | Input Rise Time          | 1.5V to 3V                            |       | 1000                  | ns   |
| t <sub>F</sub>   | Input Fall Time          | 1.5V to 3V                            |       | 300                   | ns   |
| C <sub>I</sub>   | Input Capacitance        |                                       |       | 10                    | pF   |

|                 |                          |                                       |       |                       |    |
|-----------------|--------------------------|---------------------------------------|-------|-----------------------|----|
| SDA             |                          |                                       |       |                       |    |
| V <sub>IL</sub> | Low Level Input Voltage  |                                       | - 0.3 | + 1.5                 | V  |
| V <sub>IH</sub> | High Level Input Voltage |                                       | 3.0   | V <sub>CC</sub> + 0.5 | V  |
| I <sub>LI</sub> | Input Leakage Current    | V <sub>I</sub> = 0 to V <sub>CC</sub> | - 10  | + 10                  | μA |
| C <sub>I</sub>  | Input Capacitance        |                                       |       | 10                    | pF |
| t <sub>R</sub>  | Input Rise Time          | 1.5V to 3V                            |       | 1000                  | ns |
| t <sub>F</sub>  | Input Fall Time          | 1.5V to 3V                            |       | 300                   | ns |
| V <sub>OL</sub> | Low Level Output Voltage | I <sub>OL</sub> = 3mA                 |       | 0.4                   | V  |
| t <sub>F</sub>  | Output Fall Time         | 3V to 1.5V                            |       | 250                   | ns |
| C <sub>L</sub>  | Load Capacitance         |                                       |       | 400                   | pF |

|                      |  |  |     |     |    |
|----------------------|--|--|-----|-----|----|
| TIMING               |  |  |     |     |    |
| t <sub>LOW</sub>     | Clock Low Period   |  | 4.7 |     | μs |
| t <sub>HIGH</sub>    | Clock High Period  |  | 4.0 |     | μs |
| t <sub>SU, DAT</sub> | Data Set-up Time   |  | 250 |     | ns |
| t <sub>HD, DAT</sub> | Data Hold Time   |  | 0   | 340 | ns |
| t <sub>SU, STO</sub> | Set-up Time from Clock High to Stop                      |  | 4.0 |     | μs |
| t <sub>BUF</sub>     | Start Set-up Time following a Stop                       |  | 4.7 |     | μs |
| t <sub>HD, STA</sub> | Start Hold Time  |  | 4.0 |     | μs |
| t <sub>SU, STA</sub> | Start Set-up Time following Clock Low-to-High Transition |  | 4.7 |     | μs |

6415C-06.TBL

**Figure 1 : I<sup>2</sup>C Bus Timing**



6415C-10.EPS

**BUS SELECTIONS (I<sup>2</sup>C-BUS)**

2nd byte of transmission

| ADDRESS<br>MSB | DATA<br>LSB | Selected Output |                                    |
|----------------|-------------|-----------------|------------------------------------|
| 00000          | XXX         | Pin 18          | Output is selected by address bits |
| 00100          | XXX         | Pin 14          |                                    |
| 00010          | XXX         | Pin 16          |                                    |
| 00110          | ---         | Not used        |                                    |
| 00001          | XXX         | Pin 17          |                                    |
| 00101          | XXX         | Pin 13          |                                    |
| 00011          | XXX         | Pin 15          |                                    |
| 00111          | ---         | Not used        |                                    |
|                |             | Selected Input  |                                    |
| 00XXX          | 000         | Pin 5           | Input is selected by data bits     |
| 00XXX          | 100         | Pin 8           |                                    |
| 00XXX          | 010         | Pin 3           |                                    |
| 00XXX          | 110         | Pin 20          |                                    |
| 00XXX          | 001         | Pin 6           |                                    |
| 00XXX          | 101         | Pin 10          |                                    |
| 00XXX          | 011         | Pin 1           |                                    |
| 00XXX          | 111         | Pin 11          |                                    |

6415C-04.TBL

**Example** :00100 101 connects Pin 10 (input) to Pin 14 (output) (equals 25 in hexadecimal)  
 Address byte (1st byte of transmission)

|    |      |      |
|----|------|------|
| 86 | 1000 | 0110 |
| 06 | 0000 | 0110 |

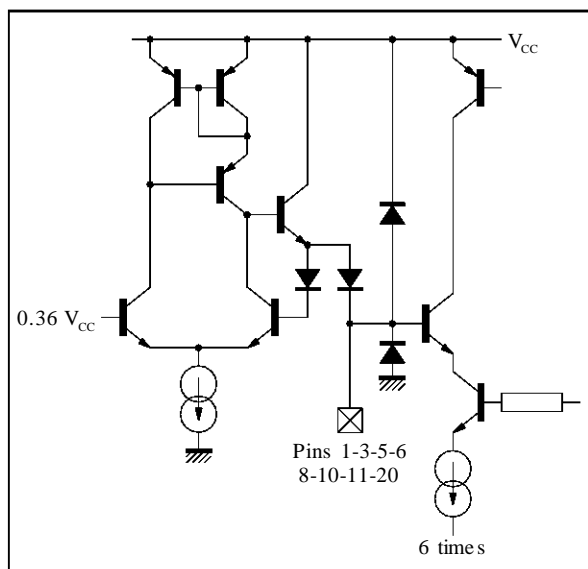
When pin PROG is connected to ground

When pin PROG is connected to V<sub>CC</sub>

6415C-05.TBL

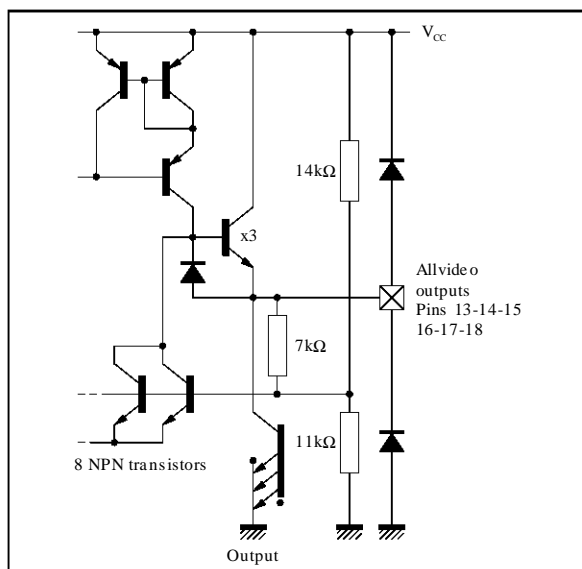
**IN / OUT PIN CONFIGURATION**

**Figure 2 : Input Configuration**



6415C-03.EPS

**Figure 3 : Output Configuration**



6415C-04.EPS

IN / OUT PIN CONFIGURATION (continued)

Figure 4 : Bus I/O Configuration

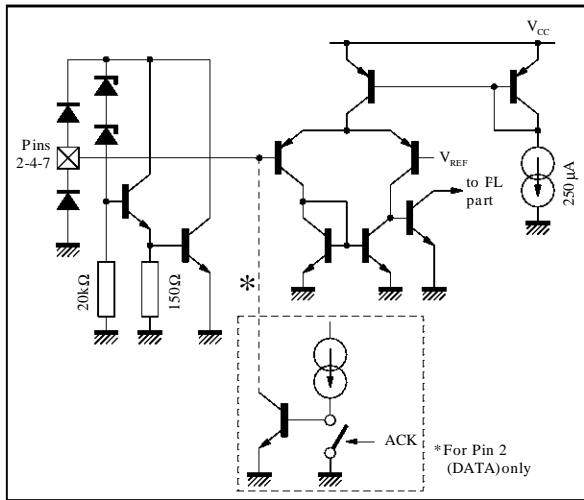
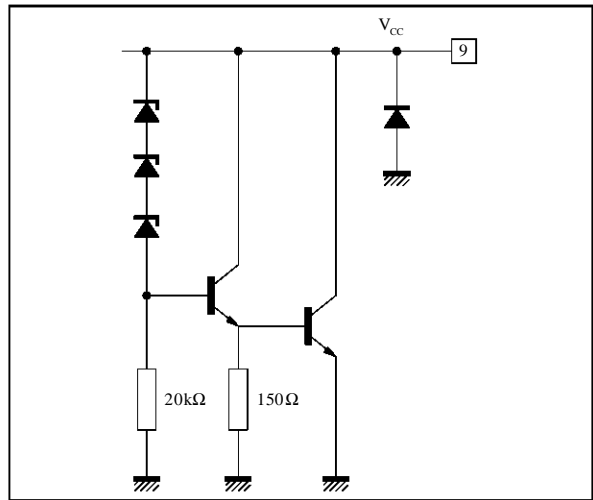


Figure 5 : Vcc Pin Configuration

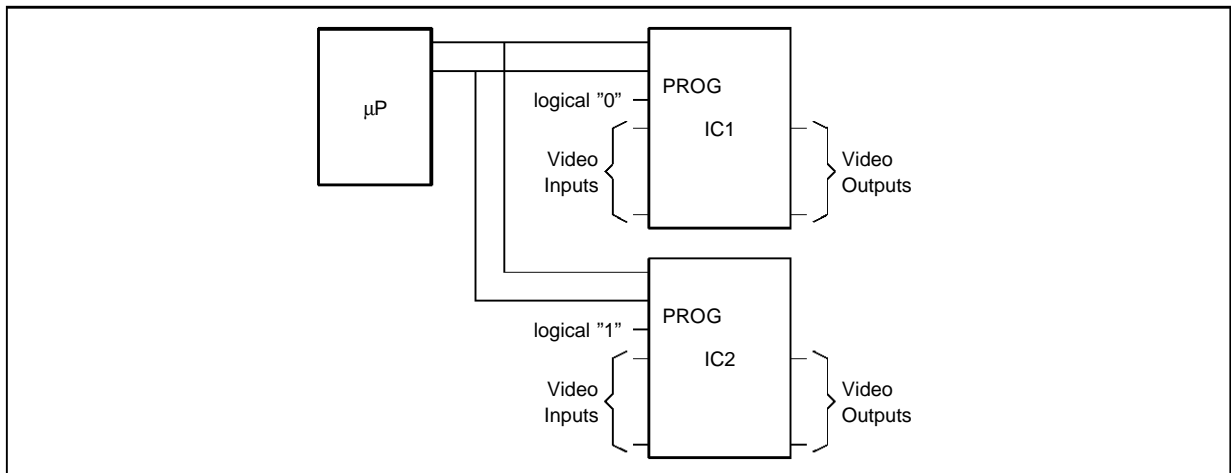


USE WITH AN OTHER TEA6415C

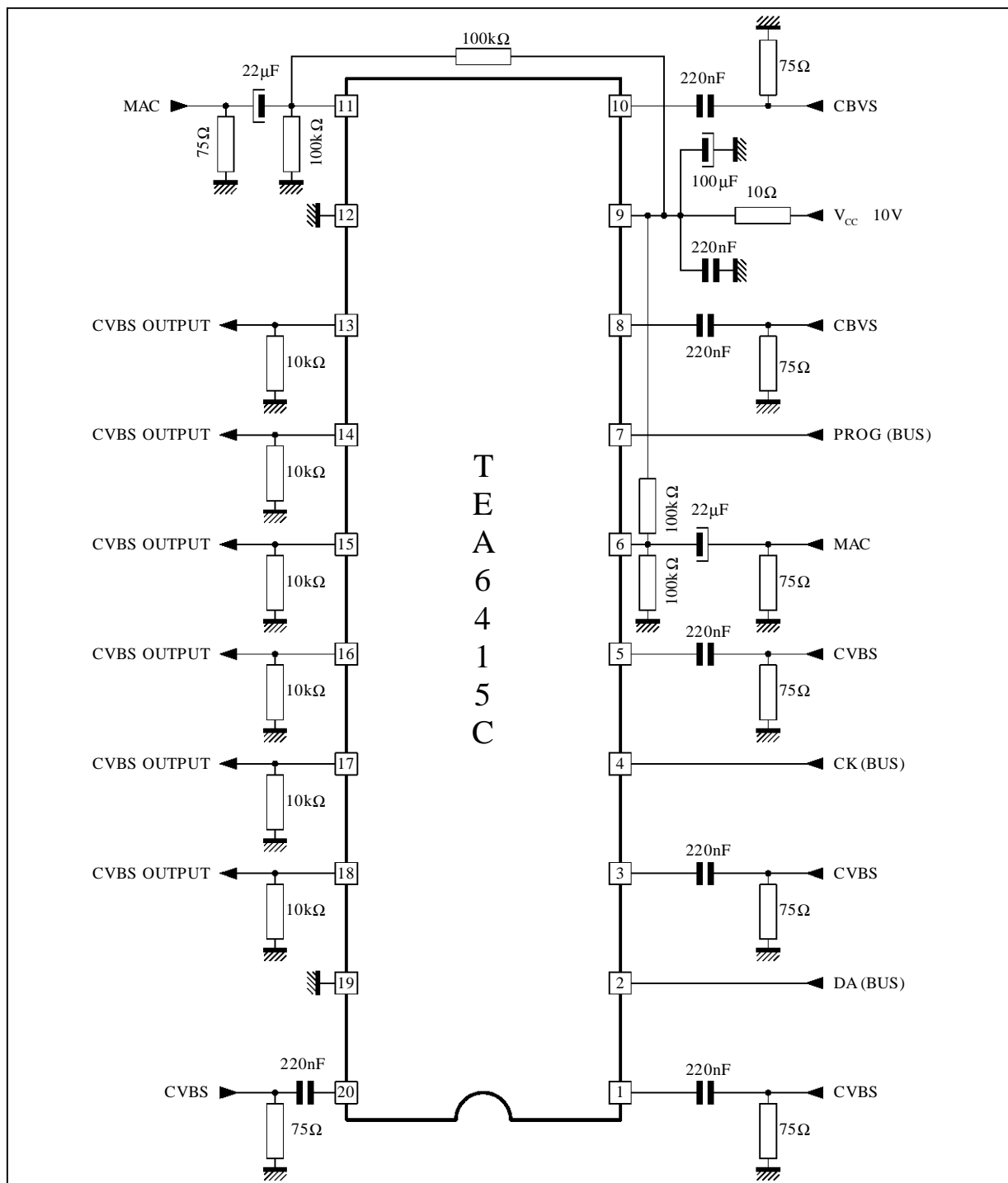
The programming input (PROG) permits to operate with two TEA6415C in parallel and to select them independantly through the I<sup>2</sup>C-BUS without

modifying the adress byte. Consequently, the switch capabilities are doubled or IC1 and IC2 can be cascaded.

Figure 6



TYPICAL APPLICATION



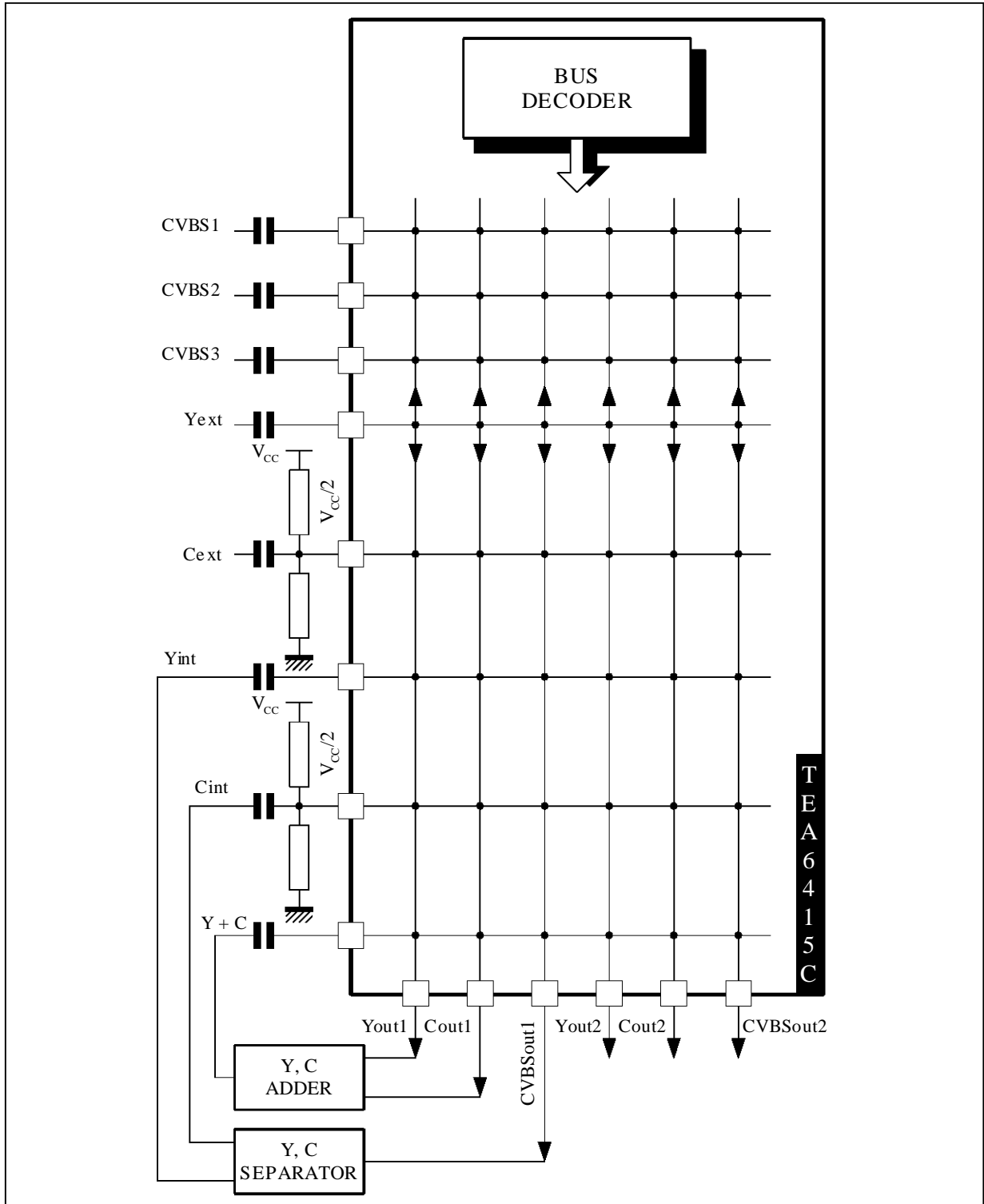
6415C-08.EPS

CROSSTALK IMPROVEMENT

1 - When any input is not used, it must be bypassed to ground through a 220nF capacitor.

2 - An important improvement can be achieved considering the input crosstalk by means of the application (see technical note).

OTHER APPLICATION DIAGRAM EXAMPLE

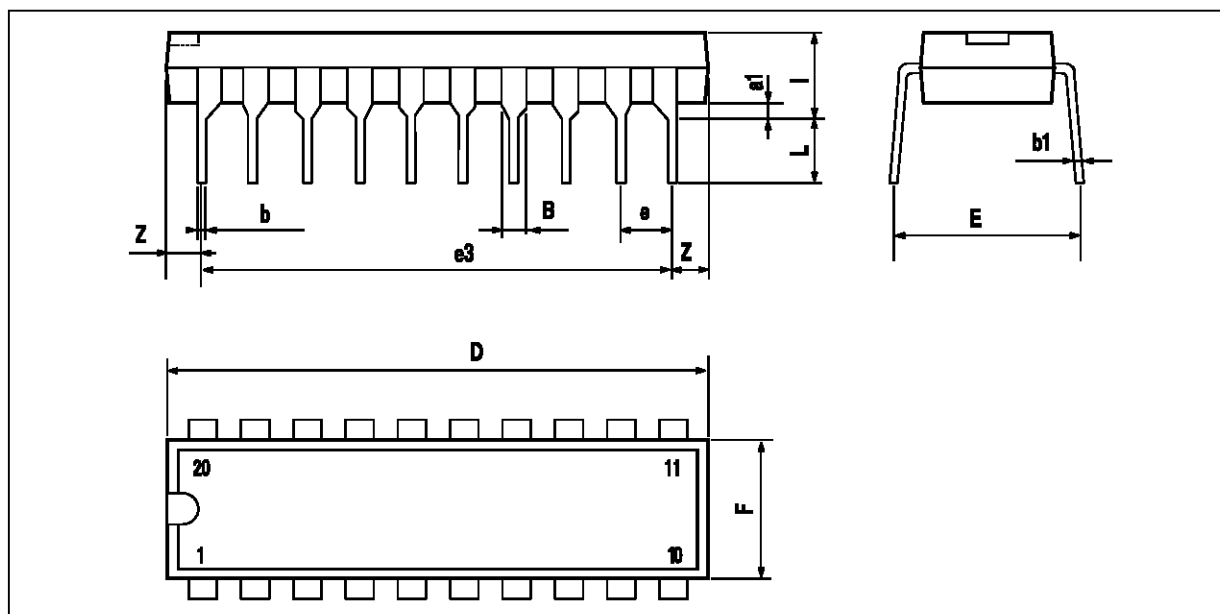


6415C-09/EPS



## PACKAGE MECHANICAL DATA

20 PINS – PLASTIC DIP

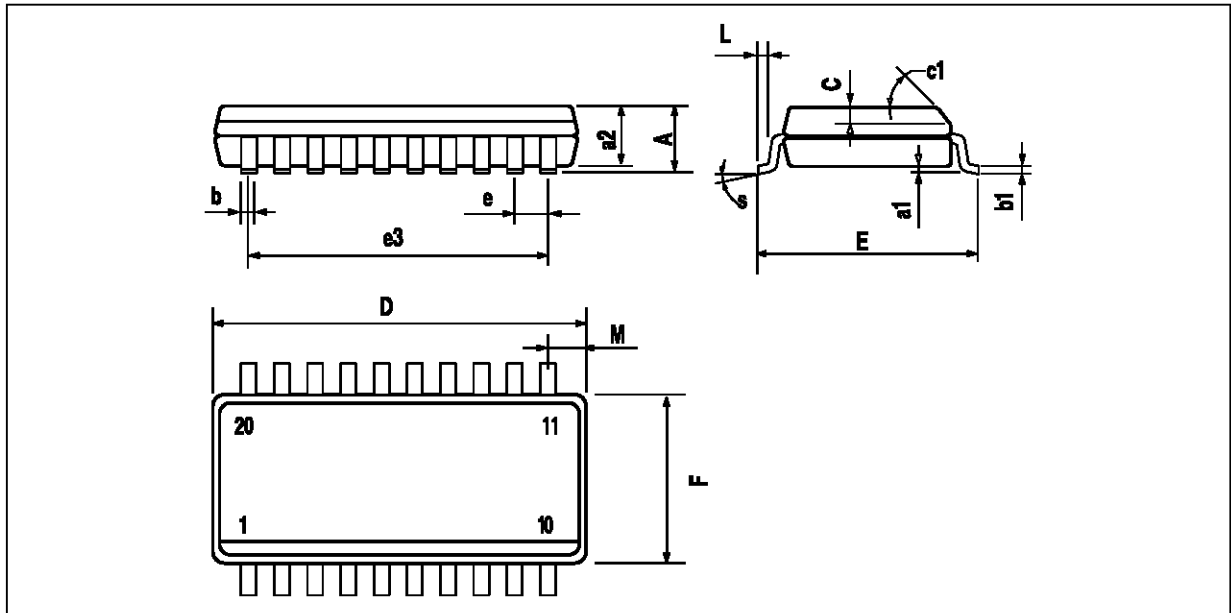


PM-DIP20LEPS

| Dimensions | Millimeters |       |      | Inches |       |       |
|------------|-------------|-------|------|--------|-------|-------|
|            | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| a1         | 0.254       |       |      | 0.010  |       |       |
| B          | 1.39        |       | 1.65 | 0.055  |       | 0.065 |
| b          |             | 0.45  |      |        | 0.018 |       |
| b1         |             | 0.25  |      |        | 0.010 |       |
| D          |             |       | 25.4 |        |       | 1.000 |
| E          |             | 8.5   |      |        | 0.335 |       |
| e          |             | 2.54  |      |        | 0.100 |       |
| e3         |             | 22.86 |      |        | 0.900 |       |
| F          |             |       | 7.1  |        |       | 0.280 |
| l          |             |       | 3.93 |        |       | 0.155 |
| L          |             | 3.3   |      |        | 0.130 |       |
| Z          |             |       | 1.34 |        |       | 0.053 |

DIP20.TBL

**PACKAGE MECHANICAL DATA**  
 20 PINS – PLASTIC MICROPACKAGE (SO)



PM-SO20.EPS

| Dimensions | Millimeters |       |       | Inches |       |       |
|------------|-------------|-------|-------|--------|-------|-------|
|            | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A          |             |       | 2.65  |        |       | 0.104 |
| a1         | 0.1         |       | 0.3   | 0.004  |       | 0.012 |
| a2         |             |       | 2.45  |        |       | 0.096 |
| b          | 0.35        |       | 0.49  | 0.014  |       | 0.019 |
| b1         | 0.23        |       | 0.32  | 0.009  |       | 0.013 |
| C          |             | 0.5   |       |        | 0.020 |       |
| c1         | 45° (typ.)  |       |       |        |       |       |
| D          | 12.6        |       | 13.0  | 0.496  |       | 0.512 |
| E          | 10          |       | 10.65 | 0.394  |       | 0.419 |
| e          |             | 1.27  |       |        | 0.050 |       |
| e3         |             | 11.43 |       |        | 0.450 |       |
| F          | 7.4         |       | 7.6   | 0.291  |       | 0.299 |
| L          | 0.5         |       | 1.27  | 0.020  |       | 0.050 |
| M          |             |       | 0.75  |        |       | 0.030 |
| S          | 8° (Max.)   |       |       |        |       |       |

SO20.TBL

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No licence is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1996 SGS-THOMSON Microelectronics - All Rights Reserved

Purchase of I<sup>2</sup>C Components of SGS-THOMSON Microelectronics, conveys a license under the Philips I<sup>2</sup>C Patent. Rights to use these components in a I<sup>2</sup>C system, is granted provided that the system conforms to the I<sup>2</sup>C Standard Specifications as defined by Philips.

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - China - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco  
 The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.