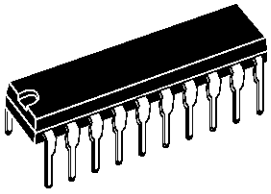
SGS-THOMSON MICROELECTRONICS

TEA6415C

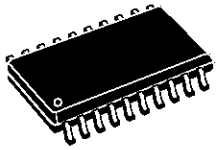
BUS-CONTROLLED VIDEO MATRIX SWITCH

- 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



DIP20
(Plastic Package)

ORDER CODE : TEA6415C



SO20
(Plastic Micropackage)

ORDER CODE : TEA6415CD

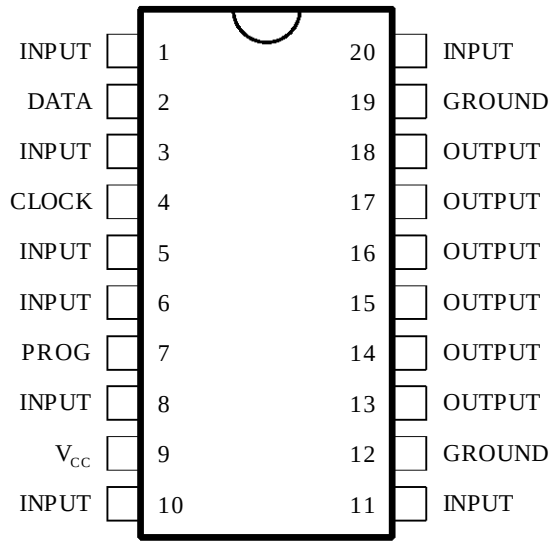
DESCRIPTION

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.

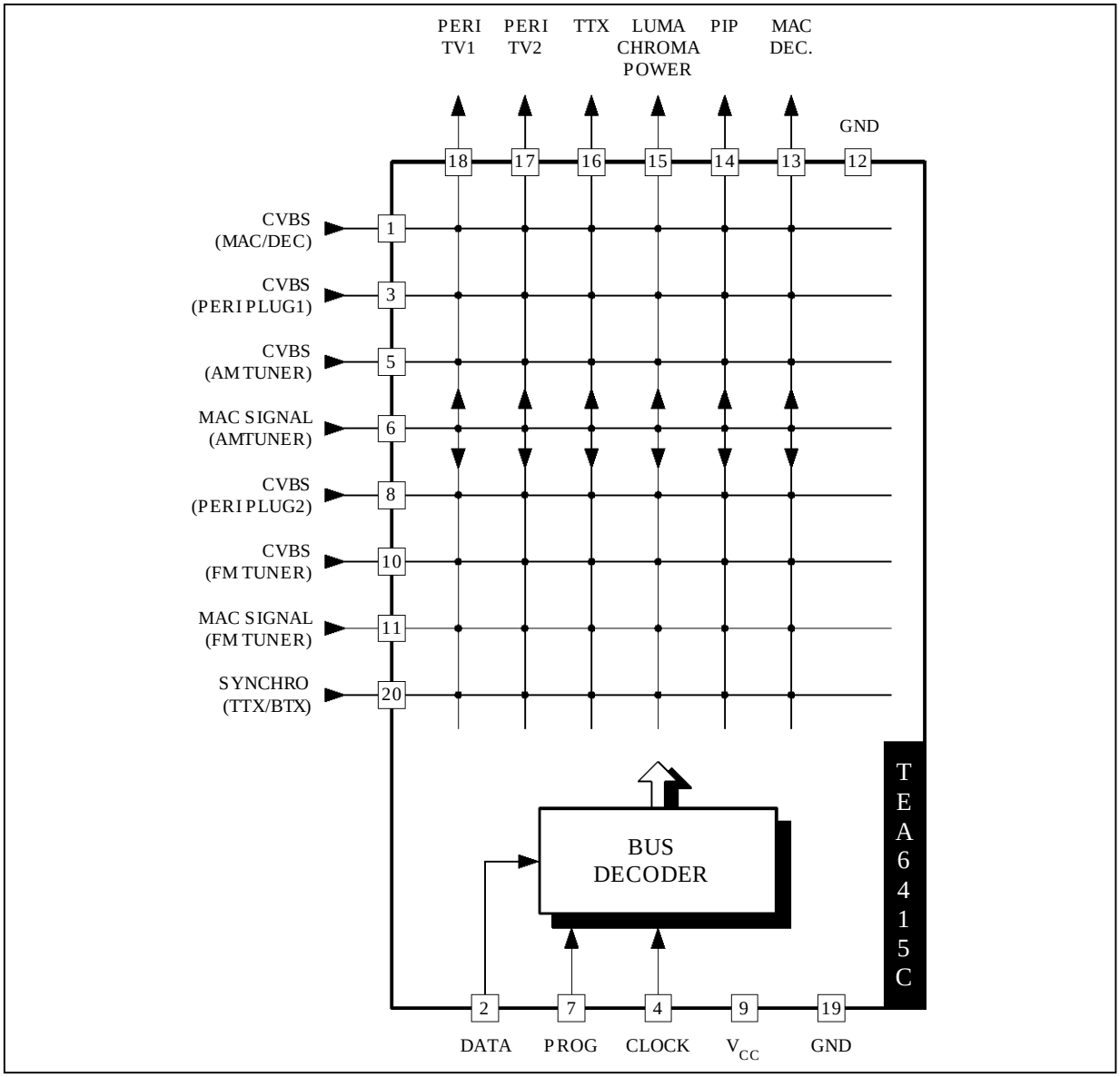
All the switching possibilities are controlled through the I^2C bus.

PIN CONNECTIONS



6415C-01.EPS

BLOCK DIAGRAM



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_{DC} 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_{CC}	Supply Voltage (Pin 9)	12	V
T_A	Operating Ambient Temperature	0, +70	^oC
T_{stg}	Storage Temperature	- 20, +150	^oC

6415C-01.TBL

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th(j-a)}$	Junction-Ambient Thermal Resistance	DIP20 SO20	80 100	$^oC/W$ $^oC/W$

6415C-02.TBL

ELECTRICAL CHARACTERISTICS

$T_A = 25^oC$, $V_{CC} = 10V$, $R_{LOAD} = 10k\Omega$, $C_{LOAD} = 3pF$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage (Pin 9)	8	10	11	V
I_{CC}	Power Supply Current (without load on outputs ; V_{CC} =10V)	20	30	40	mA
INPUTS					
	Signal Amplitude (CVBS signal)			2	V_{PP}
	Input Current (per output connected, input voltage = $5V_{DC}$) (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^oC)		5	100	mV
OUTPUTS (V_{IN} = $1V_{PP}$ for all dynamic tests) Pins 13 - 14 - 15 - 16 - 17 - 18					
	Dynamic	4.5	5.5		V_{PP}
	Output Impedance		25	50	Ω
	Gain	6	6.5	7	dB
	Bandwidth -1dB attenuation -3dB attenuation	7	 15 20		 MHz MHz
	Crosstalk f = 5MHz f = 3.58MHz		 - 55 - 60	 - 45 - 50	 dB dB
	DC level	2.4	2.75	3.1	V

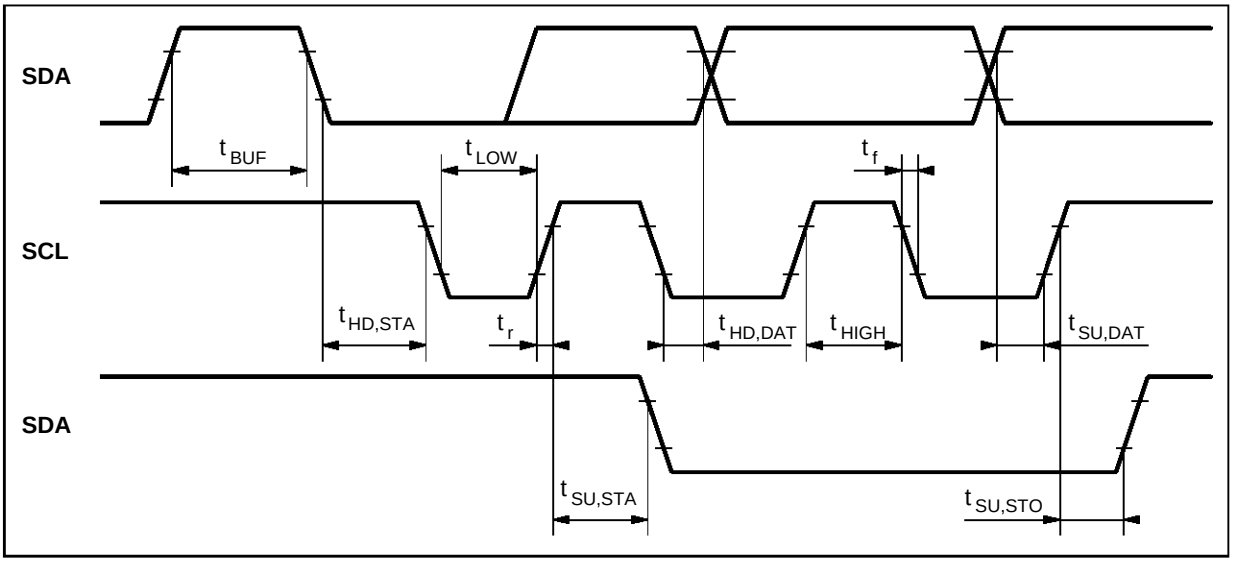
6415C-03.TBL

I²C BUS CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
SCL					
V_{IL}	Low Level Input Voltage		- 0.3	+ 1.5	V
V_{IH}	High Level Input Voltage		3.0	V_{CC} + 0.5	V
I_{LI}	Input Leakage Current	V_I = 0 to V_{CC}	- 10	+ 10	µA
f_{SCL}	Clock Frequency		0	100	kHz
t_R	Input Rise Time	1.5V to 3V		1000	ns
t_F	Input Fall Time	1.5V to 3V		300	ns
C_I	Input Capacitance			10	pF
SDA					
V_{IL}	Low Level Input Voltage		- 0.3	+ 1.5	V
V_{IH}	High Level Input Voltage		3.0	V_{CC} + 0.5	V
I_{LI}	Input Leakage Current	V_I = 0 to V_{CC}	- 10	+ 10	µA
C_I	Input Capacitance			10	pF
t_R	Input Rise Time	1.5V to 3V		1000	ns
t_F	Input Fall Time	1.5V to 3V		300	ns
V_{OL}	Low Level Output Voltage	I_{OL} = 3mA		0.4	V
t_F	Output Fall Time	3V to 1.5V		250	ns
C_L	Load Capacitance			400	pF
TIMING					
t_{LOW}	Clock Low Period		4.7		µs
t_{HIGH}	Clock High Period		4.0		µs
$t_{SU, DAT}$	Data Set-up Time		250		ns
$t_{HD, DAT}$	Data Hold Time		0	340	ns
$t_{SU, STO}$	Set-up Time from Clock High to Stop		4.0		µs
t_{BUF}	Start Set-up Time following a Stop		4.7		µs
$t_{HD, STA}$	Start Hold Time		4.0		µs
$t_{SU, STA}$	Start Set-up Time following Clock Low-to High Transition		4.7		µs

6415C-06.TBL

Figure 1 : I²C Bus Timing



6415C-10.EPS

BUS SELECTIONS (I^2C-BUS)

2nd byte of transmission

ADDRESS MSB	DATA 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)

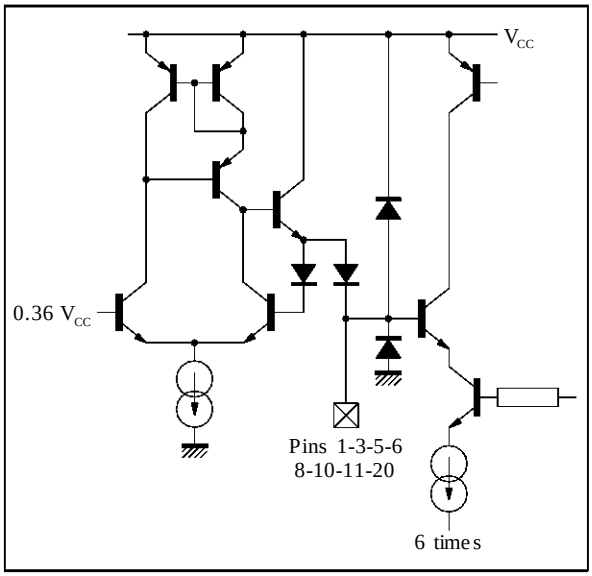
Adress byte (1st byte of transmission)

86	1000	0110	When pin PROG is connected to ground
06	0000	0110	When pin PROG is connected to V_{CC}

6415C-05.TBL

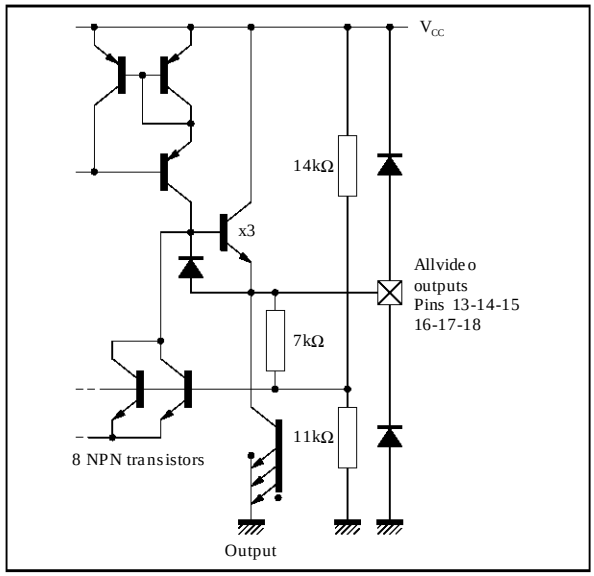
IN / OUT PIN CONFIGURATION

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

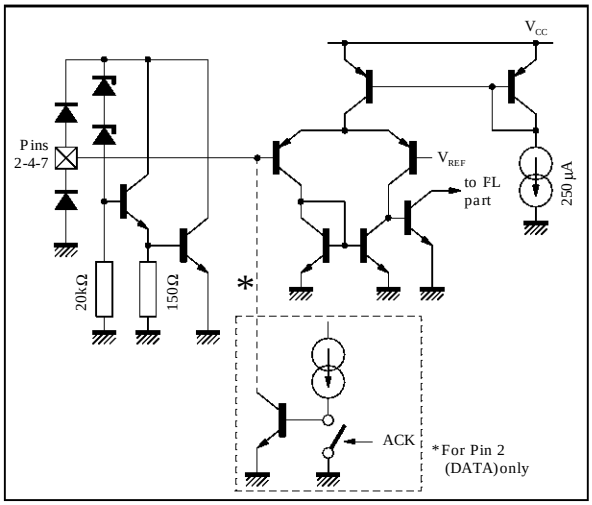
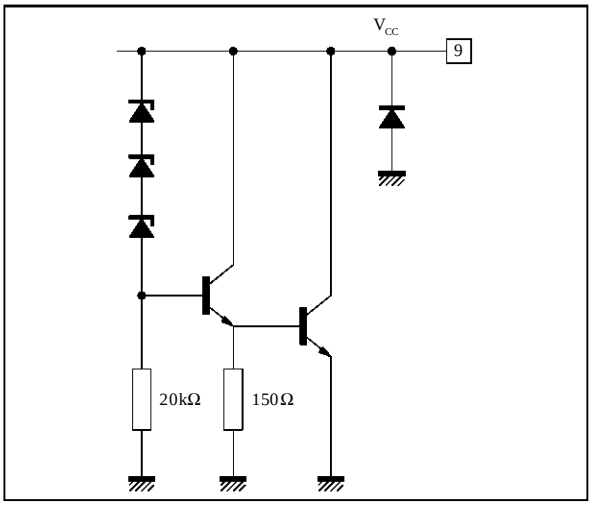


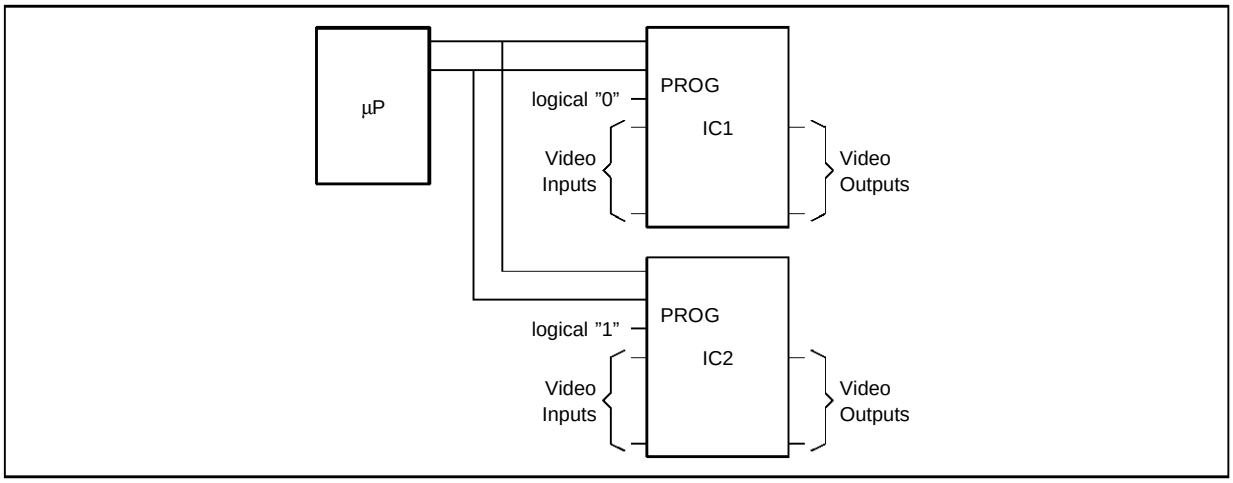
Figure 5 : V_{CC} Pin Configuration



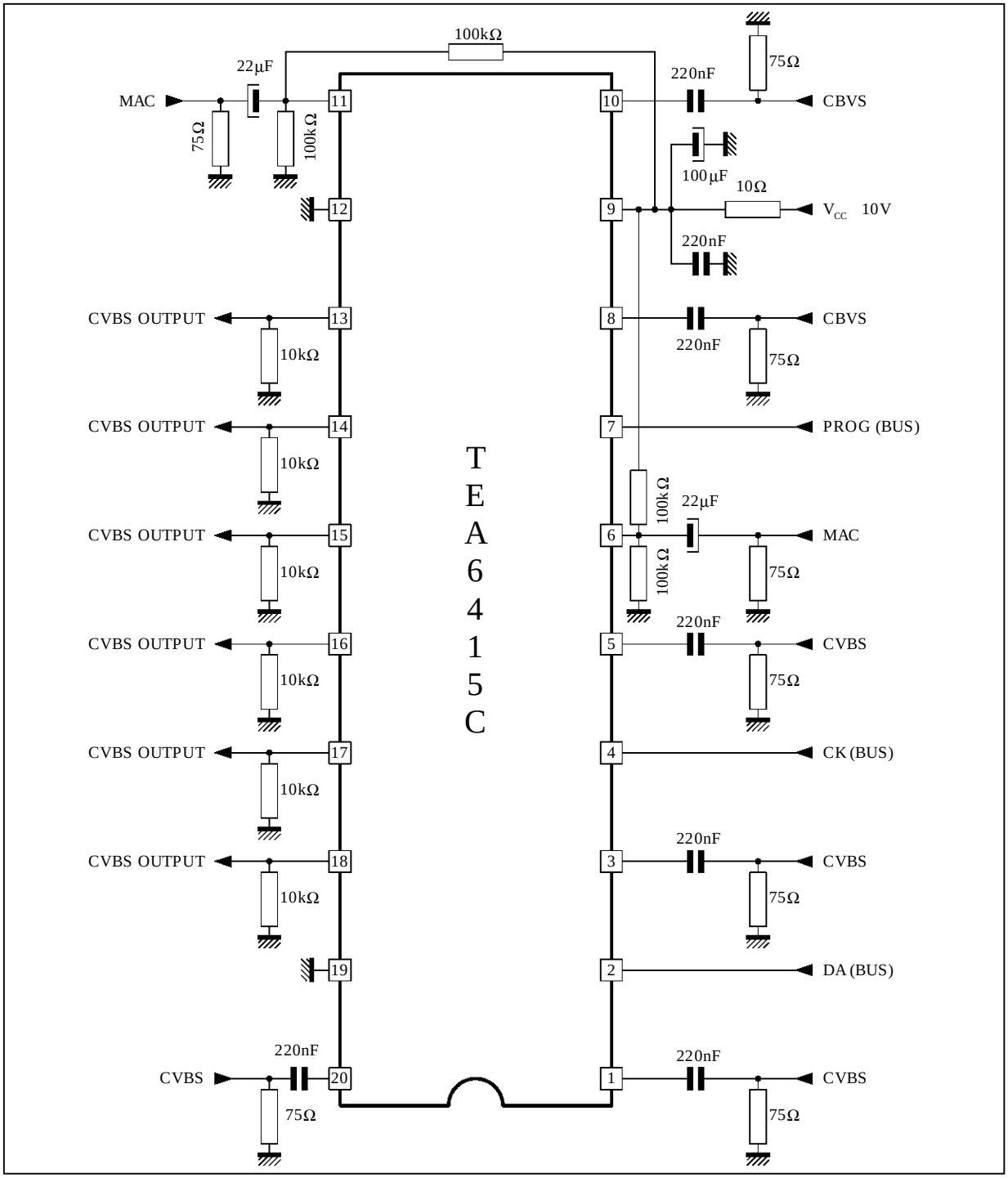
USE WITH AN OTHER TEA6415C

The programmation input (PROG) permits to operate with two TEA6415C in parallel and to select them independantly through the I^2C-BUS without modifying the adress byte. Consequently, the switch capabilities are doubled or IC1 and IC2 can be cascaded.

Figure 6



TYPICAL APPLICATION

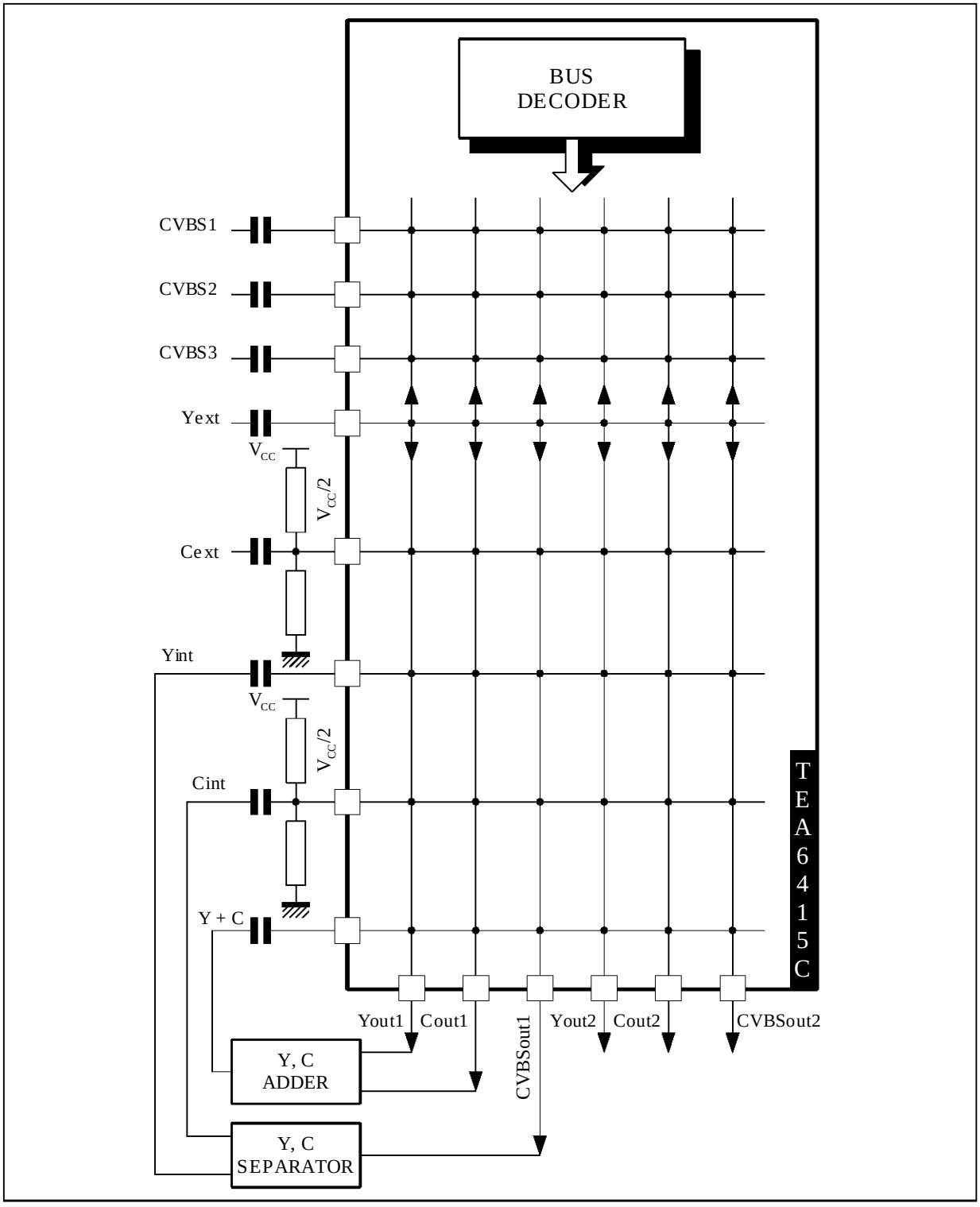


CROSSTALK IMPROVEMENT

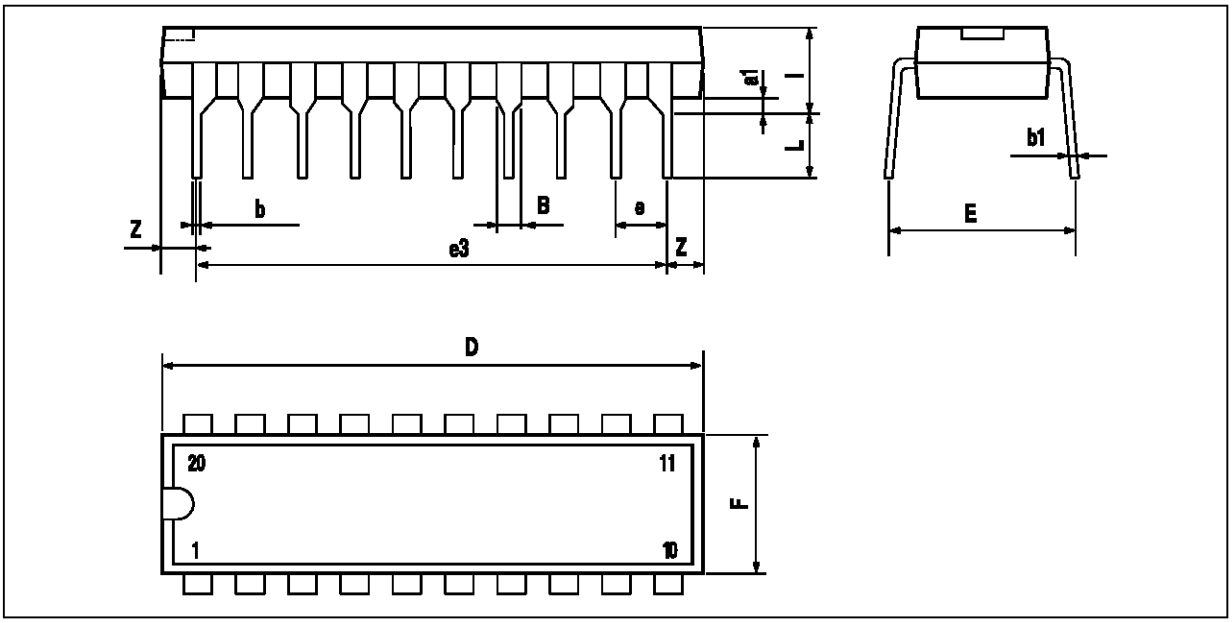
1 - When any input is not used, it must be bypassed to ground through a 220nF capacitor.

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

OTHER APPLICATION DIAGRAM EXAMPLE



PACKAGE MECHANICAL DATA
20 PINS – PLASTIC DIP



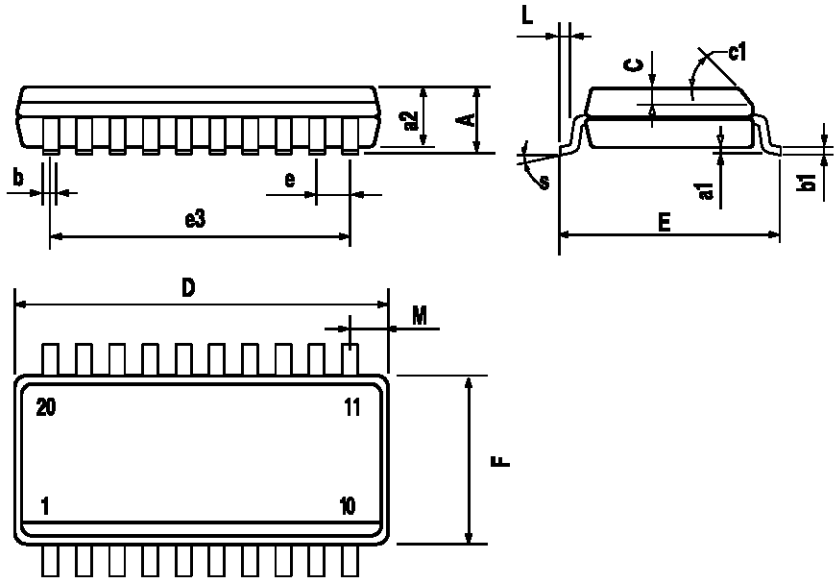
PM-DIP20.EPS

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
I			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^o (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^o (Max.)					

SO20.TBL