

SIEMENS

HER 16 CHARACTER **IDA7135-16**

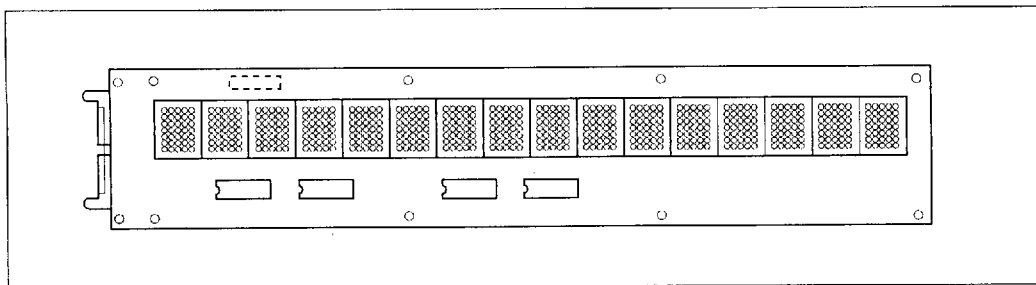
HER 20 CHARACTER **IDA7135-20**

GREEN 16 CHARACTER **IDA7137-16**

GREEN 20 CHARACTER **IDA7137-20**

**.68" HIGH, 5 X 7 DOT MATRIX
Intelligent Display® Assembly**

Intelligent
Display Devices



FEATURES

- .68" 5 X 7 Dot Matrix Character
- Complete Alphanumeric Display Assembly Using the DLO7135/DLG7137
 - Built-in Multiplex and LED Drive Circuitry
 - Built-in Memory
 - Built-in Character Generator
- 96 Character ASCII Set, Upper and Lower Case
- Direct Access to Each Digit Independently
- Three Brightness Levels
- Display Blank Function
- Lamp Test Function
- Wide Viewing Angle: $\pm 50^\circ$
- Readable in High Ambient Lighting
- Colors: High Efficiency Red and Green
- 16 or 20 Character Display Lengths
Custom Lengths (Increments of 4 Characters) by Request
- Single 5.0 Volt Power Supply
- Easily Interfaced to a Microprocessor
- TTL Compatible
- Fully Buffered Inputs

DESCRIPTION

The IDA7135/7137-16/-20 assembly is an extension of the DLO7135 (high efficiency red) and DLG7137 (green) 5 X 7 dot matrix Intelligent Display. This assembly provides the designer with circuitry for display maintenance. It also minimizes interaction and interface normally required between the user's system and a multiplexed alphanumeric display.

The assembly consists of sixteen/twenty DLX7135/7s in a single row, together with decoder and interface buffers on a single printed circuit board. Each DLX7135/7 provides its own memory, ASCII ROM character decoder, multiplexing circuitry, and drivers for 35 LED dots.

Intelligent Display Assemblies can be used for applications such as P.O.S. terminals, message systems, industrial equipment, instrumentation, and other products requiring a large, easily readable, user friendly alphanumeric display.

For additional information refer to Appnote 25. For cleaning we recommend de-ionized water, isopropyl alcohol, Freon TE or Freon TF.

Important: Refer to Appnote 18, "Using and Handling Intelligent Displays." Since this is a CMOS device, normal precautions should be taken to avoid static damage.

Maximum Ratings

V_{CC}	6.0 V
Voltage, Applied to Any Input	-0.5 to $V_{CC} + 0.5$ Vdc
Operating Temperature	0°C to +65°C
Storage Temperature	-20°C to +65°C
Relative Humidity (non-condensing) at 65°C	85%

Technical drawing showing dimensions in inches (") and millimeters (mm). Key dimensions include:

- Overall length: 500 (12.7)
- Overall width: 300 (7.62)
- Top edge dimensions: 150 (3.81), 480 REF. (12.19), 580 REF. (17.27)
- Bottom edge dimensions: 150 (3.81), 2.30 (58.42), 2.00 (50.80), 550 REF. (13.97), 325 REF. (8.26)
- Internal features: J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20, J21, J22, J23, J24, J25, J26, J27, J28, J29, J30, J31, J32, J33, J34, J35, J36, J37, J38, J39, J40, J41, J42, J43, J44, J45, J46, J47, J48, J49, J50, J51, J52, J53, J54, J55, J56, J57, J58, J59, J60, J61, J62, J63, J64, J65, J66, J67, J68, J69, J70, J71, J72, J73, J74, J75, J76, J77, J78, J79, J80, J81, J82, J83, J84, J85, J86, J87, J88, J89, J90, J91, J92, J93, J94, J95, J96, J97, J98, J99, J100
- Detail view dimensions: .060 (1.52), .530 REF. (13.46)

Part No.	A	B	C	D
IDA7135/7-16	3.80 typ. (96.52)	11.90 (302.26)	12.20 (309.88)	.120 typ. 10 plcs. (3.05)
IDA7135/7-20	3.55 typ. (90.17)	14.70 (373.38)	15.00 (381.00)	.155 typ. 12 plcs. (3.94)

Connector	Function	Type	Suggested Manufacturer
J2	Control/Data	26 Pin Ribbon	Berg P/N 65948-011
J3	Power	Amp	Pin P/N 87026-2 Housing P/N 1-87025-3

Pin	Function
J2-1	A2 Address Line
J2-2	No Connection
J2-3	A3 Address Line
J2-4	No Connection
J2-5	A4 Address Line
J2-6	No Connection
J2-7	No Connection
J2-8	No Connection
J2-9	D0 Data Line
J2-10	No Connection
J2-11	D1 Data Line
J2-12	No Connection
J2-13	D2 Data Line
J2-14	No Connection
J2-15	D6 Data Line
J2-16	No Connection
J2-17	D4 Data Line
J2-18	BL1 Brightness
J2-19	D5 Data Line
J2-20	No Connection
J2-21	A0 Address Line
J2-22	BL0 Brightness
J2-23	A1 Address Line
J2-24	WR Write
J2-25	D3 Data Line
J2-26	LT Lamp Test
J3-1	GND
J3-2	V _{cc}
J3-3	V _{cc}
J3-4	GND

The diagram shows a 16-bit parallel adder implemented using three 74LS283 4-bit adders (U3, U4, U5) and two 74LS00 NAND gates (U1, U2). The circuit is powered by VCC-J3-3 and GND-J3-4. The 16-bit inputs are connected to the 4-bit adders as follows:

- U3 (74LS283):** Inputs 1-4 are connected to A0-J2-21, A1-J2-23, A2-J2-1, and A3-J2-3. Its output ID16 is connected to the carry-in of U4.
- U4 (74LS283):** Inputs 1-4 are connected to A4-J2-5, A5-J2-7, A6-J2-9, and A7-J2-11. Its output ID15 is connected to the carry-in of U5.
- U5 (74LS283):** Inputs 1-4 are connected to A8-J2-13, A9-J2-15, A10-J2-17, and A11-J2-19. Its output ID14 is connected to the carry-in of U6.

The carry propagation is handled by the NAND gates U1 and U2. The final 16-bit output is connected to the 16-bit bus (ID0-ID15). The circuit is labeled with component values: C1, C2 (10 mF, 20 VDC), C3, C4, C5, C6, C7 (10 mF, 20 VDC). The adders are labeled U1, U2, U3, U4, U5, U6. The inputs are labeled A0-J2-21, A1-J2-23, A2-J2-1, A3-J2-3, A4-J2-5, A5-J2-7, A6-J2-9, A7-J2-11, A8-J2-13, A9-J2-15, A10-J2-17, A11-J2-19, A12-J2-21, A13-J2-23, A14-J2-1, A15-J2-3, A16-J2-5, A17-J2-7, A18-J2-9, A19-J2-11, A20-J2-13, A21-J2-15, A22-J2-17, A23-J2-19, A24-J2-21, A25-J2-23, A26-J2-1, A27-J2-3, A28-J2-5, A29-J2-7, A30-J2-9, A31-J2-11, A32-J2-13, A33-J2-15, A34-J2-17, A35-J2-19, A36-J2-21, A37-J2-23, A38-J2-1, A39-J2-3, A40-J2-5, A41-J2-7, A42-J2-9, A43-J2-11, A44-J2-13, A45-J2-15, A46-J2-17, A47-J2-19, A48-J2-21, A49-J2-23, A50-J2-1, A51-J2-3, A52-J2-5, A53-J2-7, A54-J2-9, A55-J2-11, A56-J2-13, A57-J2-15, A58-J2-17, A59-J2-19, A60-J2-21, A61-J2-23, A62-J2-1, A63-J2-3, A64-J2-5, A65-J2-7, A66-J2-9, A67-J2-11, A68-J2-13, A69-J2-15, A70-J2-17, A71-J2-19, A72-J2-21, A73-J2-23, A74-J2-1, A75-J2-3, A76-J2-5, A77-J2-7, A78-J2-9, A79-J2-11, A80-J2-13, A81-J2-15, A82-J2-17, A83-J2-19, A84-J2-21, A85-J2-23, A86-J2-1, A87-J2-3, A88-J2-5, A89-J2-7, A90-J2-9, A91-J2-11, A92-J2-13, A93-J2-15, A94-J2-17, A95-J2-19, A96-J2-21, A97-J2-23, A98-J2-1, A99-J2-3, A100-J2-5, A101-J2-7, A102-J2-9, A103-J2-11, A104-J2-13, A105-J2-15, A106-J2-17, A107-J2-19, A108-J2-21, A109-J2-23, A110-J2-1, A111-J2-3, A112-J2-5, A113-J2-7, A114-J2-9, A115-J2-11, A116-J2-13, A117-J2-15, A118-J2-17, A119-J2-19, A120-J2-21, A121-J2-23, A122-J2-1, A123-J2-3, A124-J2-5, A125-J2-7, A126-J2-9, A127-J2-11, A128-J2-13, A129-J2-15, A130-J2-17, A131-J2-19, A132-J2-21, A133-J2-23, A134-J2-1, A135-J2-3, A136-J2-5, A137-J2-7, A138-J2-9, A139-J2-11, A140-J2-13, A141-J2-15, A142-J2-17, A143-J2-19, A144-J2-21, A145-J2-23, A146-J2-1, A147-J2-3, A148-J2-5, A149-J2-7, A150-J2-9, A151-J2-11, A152-J2-13, A153-J2-15, A154-J2-17, A155-J2-19, A156-J2-21, A157-J2-23, A158-J2-1, A159-J2-3, A160-J2-5, A161-J2-7, A162-J2-9, A163-J2-11, A164-J2-13, A165-J2-15, A166-J2-17, A167-J2-19, A168-J2-21, A169-J2-23, A170-J2-1, A171-J2-3, A172-J2-5, A173-J2-7, A174-J2-9, A175-J2-11, A176-J2-13, A177-J2-15, A178-J2-17, A179-J2-19, A180-J2-21, A181-J2-23, A182-J2-1, A183-J2-3, A184-J2-5, A185-J2-7, A186-J2-9, A187-J2-11, A188-J2-13, A189-J2-15, A190-J2-17, A191-J2-19, A192-J2-21, A193-J2-23, A194-J2-1, A195-J2-3, A196-J2-5, A197-J2-7, A198-J2-9, A199-J2-11, A200-J2-13, A201-J2-15, A202-J2-17, A203-J2-19, A204-J2-21, A205-J2-23, A206-J2-1, A207-J2-3, A208-J2-5, A209-J2-7, A210-J2-9, A211-J2-11, A212-J2-13, A213-J2-15, A214-J2-17, A215-J2-19, A216-J2-21, A217-J2-23, A218-J2-1, A219-J2-3, A220-J2-5, A221-J2-7, A222-J2-9, A223-J2-11, A224-J2-13, A225-J2-15, A226-J2-17, A227-J2-19, A228-J2-21, A229-J2-23, A230-J2-1, A231-J2-3, A232-J2-5, A233-J2-7, A234-J2-9, A235-J2-11, A236-J2-13, A237-J2-15, A238-J2-17, A239-J2-19, A240-J2-21, A241-J2-23, A242-J2-1, A243-J2-3, A244-J2-5, A245-J2-7, A246-J2-9, A247-J2-11, A248-J2-13, A249-J2-15, A250-J2-17, A251-J2-19, A252-J2-21, A253-J2-23, A254-J2-1, A255-J2-3, A256-J2-5, A257-J2-7, A258-J2-9, A259-J2-11, A260-J2-13, A261-J2-15, A262-J2-17, A263-J2-19, A264-J2-21, A265-J2-23, A266-J2-1, A267-J2-3, A268-J2-5, A269-J2-7, A270-J2-9, A271-J2-11, A272-J2-13, A273-J2-15, A274-J2-17, A275-J2-19, A276-J2-21, A277-J2-23, A278-J2-1, A279-J2-3, A280-J2-5, A281-J2-7, A282-J2-9, A283-J2-11, A284-J2-13, A285-J2-15, A286-J2-17, A287-J2-19, A288-J2-21, A289-J2-23, A290-J2-1, A291-J2-3, A292-J2-5, A293-J2-7, A294-J2-9, A295-J2-11, A296-J2-13, A297-J2-15, A298-J2-17, A299-J2-19, A300-J2-21, A301-J2-23, A302-J2-1, A303-J2-3, A304-J2-5, A305-J2-7, A306-J2-9, A307-J2-11, A308-J2-13, A309-J2-15, A310-J2-17, A311-J2-19, A312-J2-21, A313-J2-23, A314-J2-1, A315-J2-3, A316-J2-5, A317-J2-7, A318-J2-9, A319-J2-11, A320-J2-13, A321-J2-15, A322-J2-17, A323-J2-19, A324-J2-21, A325-J2-23, A326-J2-1, A327-J2-3, A328-J2-5, A329-J2-7, A330-J2-9, A331-J2-11, A332-J2-13, A333-J2-15, A334-J2-17, A335-J2-19, A336-J2-21, A337-J2-23, A338-J2-1, A339-J2-3, A340-J2-5, A341-J2-7, A342-J2-9, A343-J2-11, A344-J2-13, A345-J2-15, A346-J2-17, A347-J2-19, A348-J2-21, A349-J2-23, A350-J2-1, A351-J2-3, A352-J2-5, A353-J2-7, A354-J2-9, A355-J2-11, A356-J2-13, A357-J2-15, A358-J2-17, A359-J2-19, A360-J2-21, A361-J2-23, A362-J2-1, A363-J2-3, A364-J2-5, A365-J2-7, A366-J2-9, A367-J2-11, A368-J2-13, A369-J2-15, A370-J2-17, A371-J2-19, A372-J2-21, A373-J2-23, A374-J2-1, A375-J2-3, A376-J2-5, A377-J2-7, A378-J2-9, A379-J2-11, A380-J2-13, A381-J2-15, A382-J2-17, A383-J2-19, A384-J2-21, A385-J2-23, A386-J2-1, A387-J2-3, A388-J2-5, A389-J

- ① Part of Resistor Pack RP1 (1K SIP)
- ② Part of Resistor Pack RP2 (1K SIP)
- ③ Address bits A0–A4 are decoded by ICs, U3–U5 to enable ID0–ID19.
- ④ All like lines on all displays are tied together; e.g., LT, WR, BL1, BL0, etc.

OPTOELECTRONIC CHARACTERISTICS at 25°C

Parameter	Symbol	Min.	Typ.	Max	Units	Conditions
Supply Current/Digit	I_{CC}		170	220	mA	$V_{CC} = 5V, \overline{BL0} = \overline{BL1} = 1$
Supply Current/Digit (blank)	I_{CC}		5	10	mA	$V_{CC} = 5V, \overline{BL0} = \overline{BL1} = 0$
Supply Current /Digit	I_{CC}		85		mA	$V_{CC} = 5V, \overline{BL0} = 0, \overline{BL1} = 1$
Supply Current/Digit	I_{CC}		42		mA	$V_{CC} = 5V, \overline{BL0} = 1, \overline{BL1} = 0$
Supply Voltage	V_{CC}	4.75		5.25	VDC	
Input Voltage—High, all inputs	V_{IH}	2.7			VDC	$V_{CC} = 5V, \pm 0.25V$
Input Voltage—Low, all inputs	V_{IL}			1.0	VDC	$V_{CC} = 5V$
Input Current	I_{IL}			160	uA	$V_{CC} = 5V$
Luminous Intensity, Dot Average	I_v		250		μcd	$V_{CC} = 5V$
Peak Wavelength IDA7135 (HER) IDA7137 (green)	λ_{peak} λ_{peak}		640 565		nm nm	
Viewing Angle			±50		Deg.	

SWITCHING CHARACTERISTICS @ 5 V

Parameter at +25°C	Symbol	Min.	Unit
Write Pulse	T_W	200	nS
Data Set Up Time	T_{DS}	230	nS
Data Hold Time	T_{DH}	100	nS
Address Setup Time	T_{AS}	30	nS

Display Interface

The display interface on the 26 pin connector consists of seven data lines (D0 to D6¹), five address lines (A0 to A4²), two brightness inputs $\overline{BL0}$ to $\overline{BL1}$, lamp test (LT), the Chip Enable (\overline{CE}), and the write line (WR). All address and data lines have 1K ohm pull up resistors.

$\overline{BL0}$ and $\overline{BL1}$ (Brightness, active low): When both of these are pulled low, it causes the entire IDA display to go blank without affecting the contents of the display memory on the DLX713Xs. \overline{BL} is active regardless of address or display enable lines. These two lines are used to vary the intensity of the display to one of four levels.

\overline{WR} (Write, active low): To store a character in the display memory, this line must be pulsed low for a minimum of 200 ns. See Timing Diagram for timing and relationships to other signals.

\overline{LT} (Lamp test, active low): This line can be achieved to light all display dots.

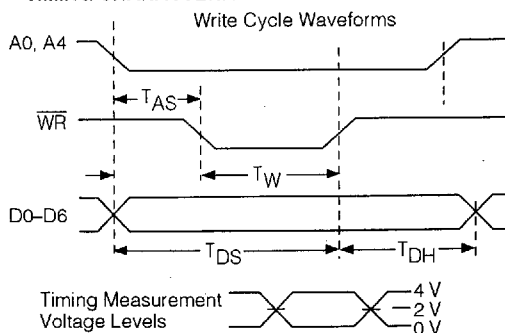
Notes:

1. For IDA713X-16 only. Four address bits are used.
2. Four address bits are used.

DIMMING AND BLANKING THE DISPLAY

Brightness Level	$\overline{BL1}$	$\overline{BL0}$
Blank	0	0
¼ Brightness	0	1
½ Brightness	1	0
Full Brightness	1	1

TIMING CHARACTERISTICS



System Overview

This Intelligent Display Assembly offers the designer a choice of either 16 (IDA713X-16) or 20 (IDA713X-20) alphanumeric characters. Based on the the DLX713X dot matrix Intelligent Display, the IDA713X adds all the support logic required for direct connection to most microprocessor buses. The system interface takes place through a 26 pin connector which has data and address lines as well as the control signals available on it. One additional connector is used for power and ground connections.

System Power Requirements

Operating from a single +5 volt power supply, the IDA713X-16 requires a typical operating current of 2720 mA at the brightness level. For the 20 character display, the typical operating current is 3400 mA. With the display blanked, the board circuitry for the 16 character assembly draws 80 mA, and the 20 character assembly draws 100 mA.

Using the Display Interface

By using memory-mapped I/O techniques, the IDA can be treated almost like a memory location—supply the data, address and proper control signals and the characters appear, with each character location independently addressable. The basic signal flow sequence to load a character would start with the address lines going to the desired address. After the address has stabilized, the data can change to the desired values. After the data has stabilized, the **WR** pulse is started, and must remain low for at least 200 ns to ensure correct loading. See the Timing Diagram. Either **BL0** or **BL1** should be held high for displays to light up.

Lamp Test

When the lamp test (**LT**) is activated, all dots on the display are illuminated at half brightness. The lamp test function is independent of write (**WR**) and the settings of the blanking inputs (**BL0**, **BL1**).

This convenient test gives a visual indication that all dots are functioning properly. Lamp test also may be used as a cursor function or pointer which does not destroy previously displayed characters.

DIGIT ADDRESSING TRUTH TABLE

Address Bit					Device Addressed
A4	A3	A1	A2	A0	
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
0	0	1	0	1	5
0	0	1	1	0	6
0	0	1	1	1	7
0	1	0	0	0	8
0	1	0	0	1	9
0	1	0	1	0	10
0	1	0	1	1	11
0	1	1	0	0	12
0	1	1	0	1	13
0	1	1	1	0	14
0	1	1	1	1	15
1	0	0	0	0	16
1	0	0	0	1	17
1	0	0	1	0	18
1	0	0	1	1	19

Notes:

- Entire area is for 20 characters; smaller portion is for 16 characters.
- Right most character is digit 0.

CHARACTER SET

ASCII CODE	D0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1																	
	D1 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1																	
	D2 0 0 0 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1																	
	D3 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1																	
D6 D5 D4	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	0	0	0	0	THESE CODES DISPLAY BLANK													
0	0	1	1															
0	1	0	2	!	@	#	\$	%	&	'	()	*	+	,	-	.	/
0	1	1	3	;	<	=	>	?	[\]	^	_	`	{		}	~
1	0	0	4															
1	0	1	5															
1	1	0	6															
1	1	1	7															

- Notes: 1. High = 1 level.
2. Low = 0 level.
3. Upon power up, the device will initialize in a random state.