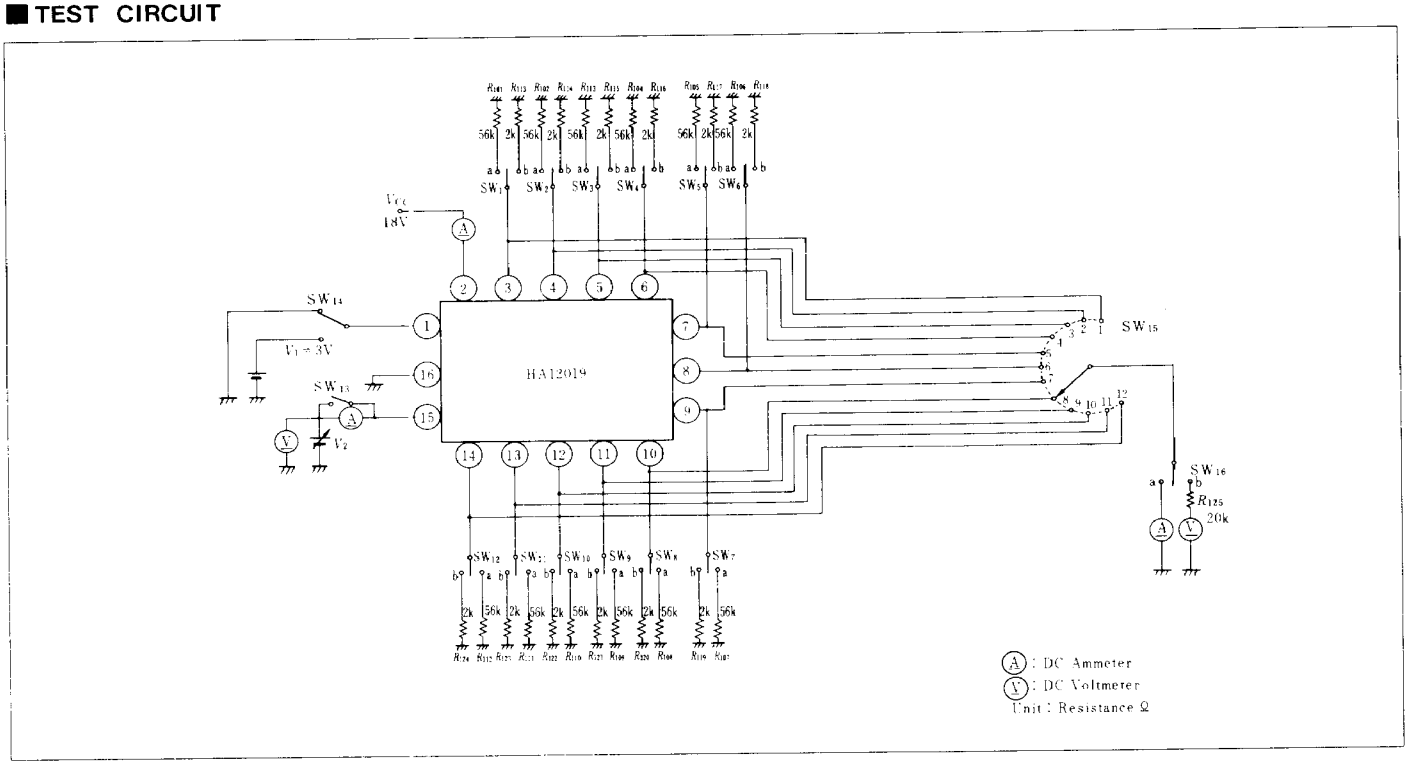
■ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Pin-14 Threshold Voltage (+8dB)	V_{th} 14	V_{in} under 15V of pin-14 Voltage	—	3.77	—	V
Pin-13 Threshold Voltage (+5dB)	V_{th} 13	V_{in} under 15V of pin-13 Voltage	—	2.67	—	V
Pin-12 Threshold Voltage (+3dB)	V_{th} 12	V_{in} under 15V of pin-12 Voltage	—	2.12	—	V
Pin-11 Threshold Voltage (+1dB)	V_{th} 11	V_{in} under 15V of pin-11 Voltage	—	1.68	—	V
Pin-10 Threshold Voltage (0dB)	V_{th} 10	V_{in} under 15V of pin-10 Voltage	1.27	1.50	1.75	V
Pin-9 Threshold Voltage (−1dB)	V_{th} 9	V_{in} under 15V of pin-9 Voltage	—	1.34	—	V
Pin-8 Threshold Voltage (−3dB)	V_{th} 8	V_{in} under 15V of pin-8 Voltage	—	1.06	—	V
Pin-7 Threshold Voltage (−5dB)	V_{th} 7	V_{in} under 15V of pin-7 Voltage	—	0.84	—	V
Pin-6 Threshold Voltage (−7dB)	V_{th} 6	V_{in} under 15V of pin-6 Voltage	—	0.67	—	V
Pin-5 Threshold Voltage (−10dB)	V_{th} 5	V_{in} under 15V of pin-5 Voltage	—	0.47	—	V
Pin-4 Threshold Voltage (−15dB)	V_{th} 4	V_{in} under 15V of pin-4 Voltage	—	0.27	—	V
Pin-3 Threshold Voltage (−20dB)	V_{th} 3	V_{in} under 15V of pin-3 Voltage	—	0.15	—	V
Pin-14 Indicating Deviation	V_{th}(+8dB)	V_{th} 14/V_{th} 10	+7.4	+8.0	+8.6	dB
Pin-13 Indicating Deviation	V_{th}(+5dB)	V_{th} 13/V_{th} 10	+4.5	+5.0	+5.5	dB
Pin-12 Indicating Deviation	V_{th}(+3dB)	V_{th} 12/V_{th} 10	+2.6	+3.0	+3.4	dB
Pin-11 Indicating Deviation	V_{th}(+1dB)	V_{th} 11/V_{th} 10	+0.6	+1.0	+1.4	dB
Pin-9 Indicating Deviation	V_{th}(−1dB)	V_{th} 9 /V_{th} 10	−1.4	−1.0	−0.6	dB
Pin-8 Indicating Deviation	V_{th}(−3dB)	V_{th} 8 /V_{th} 10	−3.4	−3.0	−2.6	dB
Pin-7 Indicating Deviation	V_{th}(−5dB)	V_{th} 7 /V_{th} 10	−5.5	−5.0	−4.5	dB
Pin-6 Indicating Deviation	V_{th}(−7dB)	V_{th} 6 /V_{th} 10	−7.6	−7.0	−6.4	dB
Pin-5 Indicating Deviation	V_{th}(−10dB)	V_{th} 5 /V_{th} 10	−10.8	−10.0	−9.2	dB
Pin-4 Indicating Deviation	V_{th}(−15dB)	V_{th} 4 /V_{th} 10	−16.0	−15.0	−14.0	dB
Pin-3 Indicating Deviation	V_{th}(−20dB)	V_{th} 3 /V_{th} 10	−23.0	−20.0	−17.0	dB
Operating Current	I_{CC}	Pin-2 inflow current under 0V of V_{in} at pin-14	—	8.0	14.3	mA
Input Outflow Current (pin-15)	I_{IL}	Outflow current under pin-15 GND	—	2.0	300	nA
Output High-Voltage (pins 3~14)	V_{OH-n}	V_{CC}=12V, R_L=2kΩ, V_{in}=4.5V Measure output voltage at pin (n=3~14)	7.7	9.5	—	V
Output Leak Current	I_{OL-n}	V_{in}=0V, Measure leak current at pin (n=3~14)	—	0.01	2	μA
Output Low-Voltage at pin-3 under 3V-supplying to Ref. (pin-1).	V_{OL} 3	V_{Ref}=3.0V, V_{in}=3.0V Measure output voltage at pin-3	—	0.56	112	mV
Output High-Voltage at pin-14 under 3V-supplying to Ref. (pin-1).	V_{OH} 14	V_{Ref}=3.0V, V_{in}=7.5V Measure output voltage at pin-14	16.0	17.3	—	V

Note) Unless otherwise specified, testing conditions are: V_{CC}=18V,
R_L (Load Resistance at pins 3~14)=56kΩ, pin-1=GND

This Material Copyrighted By Its Respective Manufacturer

■ TEST CIRCUIT



• OPERATING PRINCIPLE

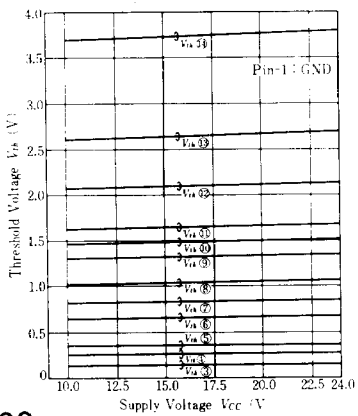
HITACHI HA12019 contains twelve voltage comparators as the diagram shows. Internal standard voltage which corresponds to each srep is supplied to the each comparator. When input DC voltage is higher than internal standard voltage, fluorescent display tube operates with high-level output of fluorescent display tube driver connected to voltage comparator output.

■ OPERATION WITH V_{Ref} SUPPLIED

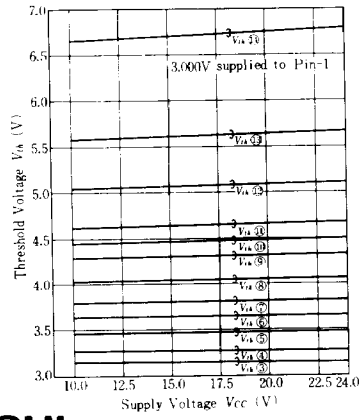
HITACHI HA12019 is enable to change the threshold voltage of pins 3~14 by supplying reference voltage (V_{Ref}) to pin-1. Threshold voltage at pins 3~14 with V_{Ref} supplied is calculated as follows.

$$\left(\begin{array}{l}\text{Threshold Voltage at}\\ \text{pin-n with } V_{Ref} \text{ supplied}\end{array}\right) = \left(\begin{array}{l}\text{Threshold Voltage at}\\ \text{pin-n with pin-1 grounded}\end{array}\right) + V_{Ref}$$

THRESHOLD VOLTAGE ③~⑭ VS. SUPPLY VOLTAGE (1)



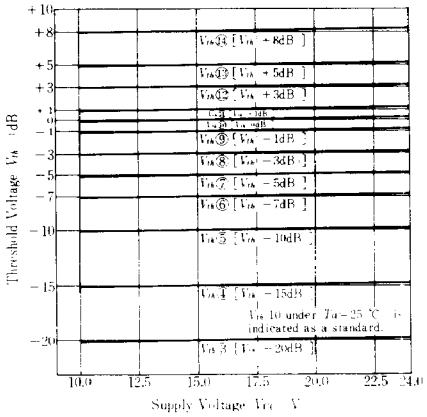
THRESHOLD VOLTAGE ③~⑭ VS. SUPPLY VOLTAGE (2)



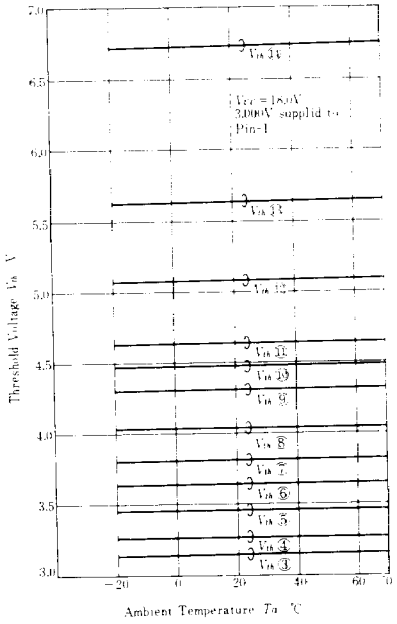
HITACHI

This Material Copyrighted By Its Respective Manufacturer

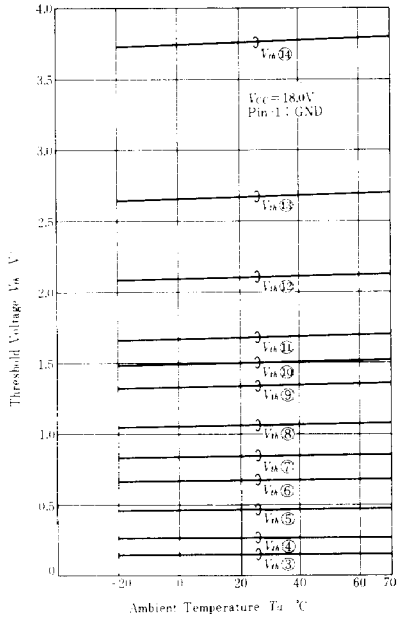
THRESHOLD VOLTAGE ③～⑭ VS. SUPPLY VOLTAGE (3)



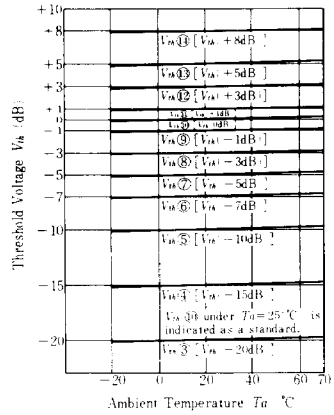
THRESHOLD VOLTAGE ③～⑭ VS. AMBIENT TEMPERATURE (2)



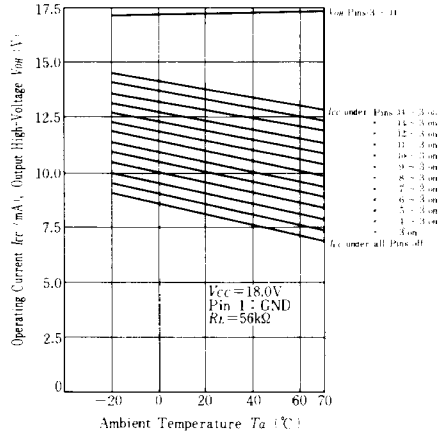
THRESHOLD VOLTAGE ③～⑭ VS. AMBIENT TEMPERATURE (1)



THRESHOLD VOLTAGE ③～⑭ VS. AMBIENT TEMPERATURE (3)



OUTPUT HIGH-VOLTAGE AND OPERATING CURRENT VS. AMBIENT TEMPERATURE



This Material Copyrighted By Its Respective Manufacturer