

FLUORESCENT MULTI DIGIT ALPHANUMERIC DISPLAY
STANDARDIZED SPECIFICATION

TYPE FG405A2

CUSTOMER _____

STANDARDIZED No. FG405A2 - 1A

STANDARDIZED DATE March 30, 1982

PUBLISHED FROM : PRODUCTS ENGINEERING DEPT.
ISE ELECTRONICS CORPORATION
Ise, Japan

TECHNICAL INFORMATION

PRODUCT:

Type : FG405A2 1/6

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TI NO

TO:

FROM: ISE ELECTRONICS CORP.
JAPAN

1. Scope

This specification covers the requirements for Fluorescent Multi-Digit Alphanumeric Display "itron" Type : FG405A2.

2. General Data

Application	Terminal Display Devices
Construction	Flat glass type with <u>40</u> digit. Direct heating cathode type. Anode selection character indication.
Color of illumination	Blue green.
Physical dimension with Terminal connections	Refer to attached Enclosure.

3. Absolute Maximum Ratings

Filament voltage	Ef	10.8	V *
Grid voltage	ec	63.0	Vp-p **
Anode voltage	eb	63.0	Vp-p **

Note : * & ** -- Refer to Para. 6-1.

Operating temperature - 10 °C to + 55 °C
At the rate of standard base at 25 °C,
Brightness at 55 °C should keep 60 % or more.

Storage temperature - 20 °C to + 70 °C

4. Electric Characteristics

Characterisitics	Symbol	Min.	Typ.	Max.	Unit
Filament voltage	Ef	8.1	9.0	9.9	Vac *
Grid voltage	ec	-	45.0	54.0	Vp-p **
Anode voltage	eb	-	45.0	54.0	Vp-p **

Note : * & **-- Refer to Para. 6-1.

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5. Electric Specification

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Filament current	If	Ef = 9.0 Vac ec = 0 Vp-p** eb = 0 Vp-p**	70.2	78.0	85.8	mAac
Grid current per digit	ic	Ef = 9.0 Vac ec = 45.0 Vp-p** eb = 45.0 Vp-p**	-	6.0	12.0	mA _{p-p}
Anode current per digit	ib	Ef = 9.0 Vac ec = 45.0 Vp-p** eb = 45.0 Vp-p**	-	6.5	13.0	mA _{p-p}
Grid cut-off voltage	*** Ecco	Ef = 9.0 Vac Eb = 45.0 Vdc	-10.0	-	-	Vdc
Anode cut-off voltage	*** Ebco	Ef = 9.0 Vac ec = 45.0 Vp-p**	-10.0	-	-	Vdc
Brightness	L	Ef = 9.0 Vac ec = 45.0 Vp-p** eb = 45.0 Vp-p**	100	-	-	fL

Note : Effective value at 60 Hz is applied for Ef above.

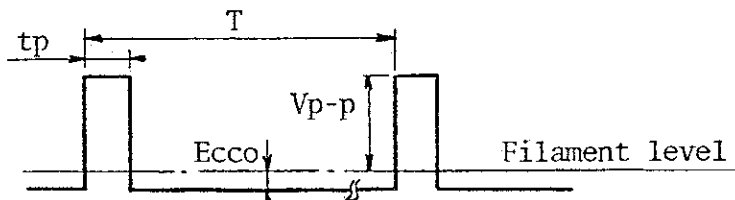
** & ***-- Refer to Para. 6-1.

6. The following notes for Para. 3, 4 & 5, and test circuit for Para. 5. shall be applied.

6-1. Note :

* : Effective value at 50/60 Hz (Vrms).

** : Pulse condition Duty factor = $\frac{1}{45} \frac{tp}{T}$
Pulse width = 100μ sec. (tp)



*** : Supplied to the center tap of the filament transformer.

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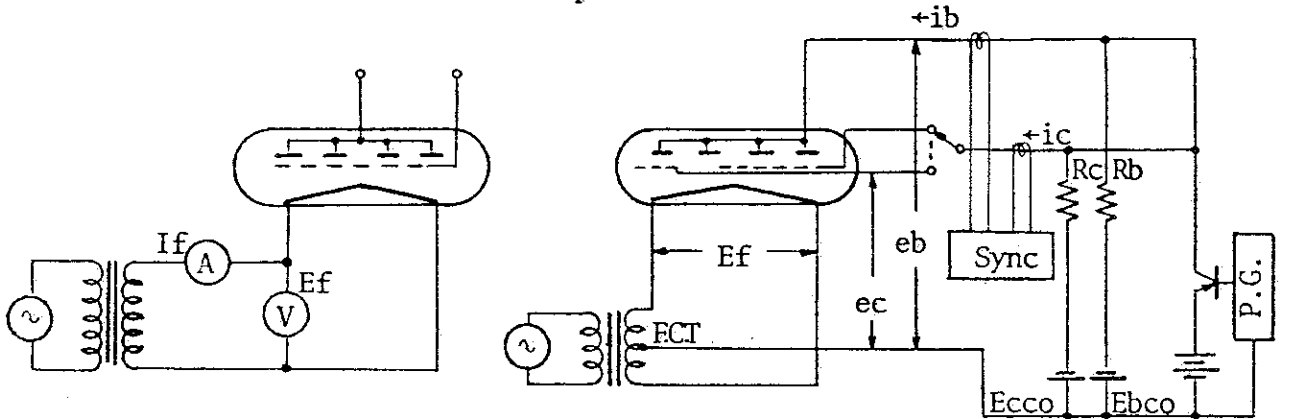
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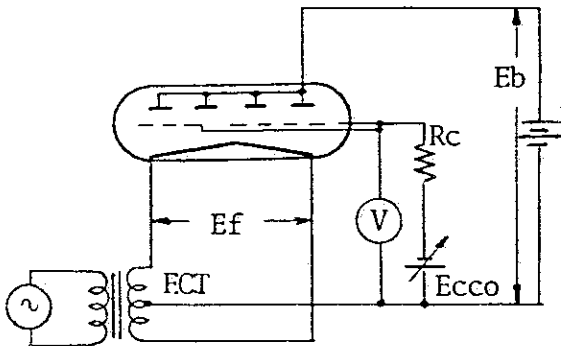
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6-2. Test Circuit to measure parameter in Para. 5.

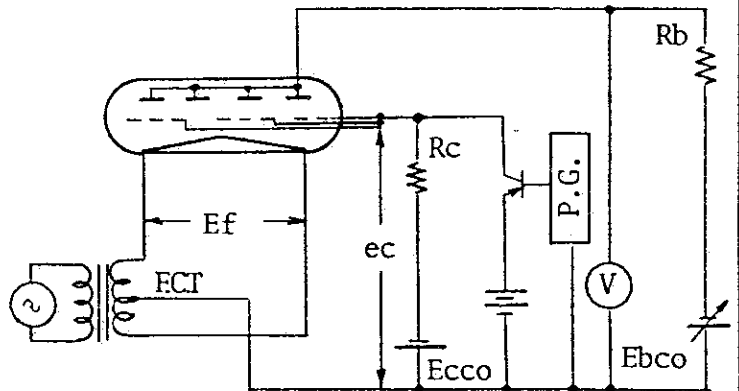


6-2-1. Filament current

6-2-2. Grid, Anode current, and Brightness



6-2-3. Grid cut-off voltage



6-2-4. Anode cut-off voltage

Sync. : Synchroscope

FCT : Filament Transformer Center Tap

P.G. : Pulse Generator

Rc = 30 K Ω

Rb = 30 K Ω

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7. Mechanical Specifications.

7-1. Vibration Test.

Any failure should not be found after the following test.

- 7-1-1. Frequency : 10-55-10 Hz for the sweep time of 60 seconds.
- 7-1-2. Amplitude : 2 mm
- 7-1-3. Duration : 30 minutes for each direction.
- 7-1-4. Direction : X, Y & Z. Three directions.

7-2. Impact Test.

Any failure should not be found after the following test.

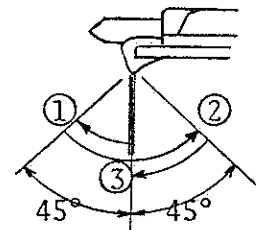
- 7-2-1. Acceleration : 100 G
- 7-2-2. Applying time : 11 msec.
- 7-2-3. Direction : X, Y & Z (X-Z for Anode)
- 7-2-4. Number of bumping : 2 times in above directions.

7-3. Lead wire (Pin) bending strength.

Requirement of lead wire bend will be referred to MIL-202E, 211A, method B and as illustrated in Fig. 1.

Any defects should not be found after testing. 1-2-3 direction = 1 cycle
2 continuous cycles performed.

Fig. 1.



7-4. Lead wire (Pin) tensile strength

Hang 2000g of weight up the wire (Pin) in the spindle direction for 10 (ten) seconds. Any defects should not be found after testing.

8. Soldering Test.

Dip lead wire (Pin) in the soldering pot for 10 (ten) seconds at temperature of $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ leaving more than 3 mm away from the base of the glass substrate. Any defects should not be found on the base of the plate and on lead wire (Pin)

9. Stains on Lead wire.

There should not be any oxidization and stains on lead wire (Pin) other than 3 mm from the base of the glass substrate.

10. Electro-Static Charge Test.

Illumination shall not be faded or caused with shadow from the effect of 700 V from the Hi-Frequency Generator close to a test display in a distance of 50 mm, however the recovery of these cause within 3 seconds shall be permissible. For this test, a display shall be lighted at typical operating condition.

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11. Illuminating Face Specification.

11-1. Measuring condition

11-1-1. A test display shall be lighted at typical operating condition as follows.

$E_f = 9.0$ Vac , Duty factor = $1/45$
 $e_{c,eb} = 45.0$ Vp-p , Pulse width = 100 μ sec.

11-1-2. Intensity around the illuminated face shall be within 30 to 100 Lux

11-1-3. The display shall be examined by the eyes at a distance of approximately 300 mm from the illuminated face.

11-2. Brightness criterion.

Minimum brightness ---As Para. 5.

11-3. Defective criterion on the illuminated face

11-3-1. Brightness Irregularity within a digit - Based on Reference sample.

11-3-2. The contrast ratios of digits in the display shall not exceed 1:2 at any display brightness intensity.

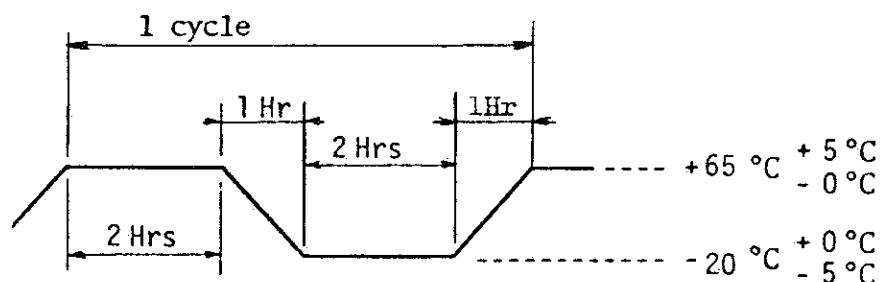
11-3-3. Black spot and spot irregularity-- Any black spot over 0.25 mm in diameter in any Digit shall constitute a defect. For less than 0.25 mm in diameter, it also constitutes a defect if black spot between 0.15 mm to 0.25 mm in diameter be found more than 2 in any Digit and 40 in all Digits.

11-3-4. Shadow --- A maximum shadow width of $1/2$ for each segment is permissible.

11-3-5. Other --- Defects on the illuminated face shall be examined by the eyes at distance of approximately 300 mm from the illuminated face. Other than specified above shall be dispositioned by joint consultation of buyer and manufacturer's representative.

12. Temperature Test.

Any failure should not be found after the following test.
8 continuous cycles.



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13. Scratch and cloud on display window.

Scratch and cloud on display windows which are observable through the specified window filter from distance greater than 300 mm shall constitute a defect.

14. Product Identification.

14-1. Marking ----

Displays shall be marked with the manufacturer's brand name, part number and Japan as follows:

	<u>Print Marking</u>		<u>Label Marking</u>
<u>Brand name</u>	<u>Part number</u>	<u>Brand name</u>	<u>Part number</u>
			
	<u>Date code</u>		<u>Production plant</u>

14-2. Manufacturer's Date Code ---

Date code shall be marked in the label or marking according to the following manner.

Production Year	1980	1981	1982	1983				
Symbol	P	Q	R	S				
Production Month	1	2	3	4	5	6	7	12
Symbol	A	B	C	D	E	F	G	L

For example : PAA ---- January, 1980

15. Quality Assurance.

15-1. Sampling and acceptance level are defined per MIL-STD-105D (single sampling plan)

15-2. The requirement of applicable paragraphs herein shall be applied at the quality level specified below.

Parameter	General inspection level	Acceptable quality level (%)	Subject to inspect
Catastrophic defects	II	0.4	Looseing fluorescent, non light. vacuum defective, crack, lead open & disconnection, Pin broken.
Electrical	II	1.5	Filament current, illuminated face Grid & Anode current, Electro-static charge.
Physical & visual	II	2.5	Outline dimension, face scratch & cloud, solderability.

16. Any change in the specification shall be decided upon joint consultation of Buyer and Manufacturer's representative, and revision notice shall be attached hereto.

