			SPEC. NO.	TQ3C-8EAC0-	E1AAYM91-00
		-	DATE	Decembe	r 22, 1999
S P E C TYPE:	KCE	3104\	For F	Reference Or	ոյ 3
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This specification is	subject to chang	e without notice	KYO0 KAG0 e. Consult Kyoc	CERA CORPOF DSHIMA HAYAT era before orde	RATION O PLANT ring.
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Original Issue Date	Designed	by: Engineerir	ng Dept.	Confirmed I	oy: QA Dept.
December 22 1999	Prepared	Checked	Approved	Checked	Approved
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1. Application

This data sheet defines the specification for a (640 x 3) x 480 dot, STN color, dot matrix type Liquid Crystal Display with CFL backlight.

2. Construction and Outline

(640 x 3) x 480 dots. COB type LCD with CFL backlight.

Backlight system:	Side-edge type CFL (2 tubes)
Inverter:	Optional
	Recommended Inverter: KCI-13 (Minebea Electronics)
Polarizer:	Anti-Glare treatment
Additional Circuit:	Bias voltage circuit, Randomizing circuit
	DC/DC Converter



3. Mechanical Specifications

ITEM	SPECIFICATION	
Outline dimensions	264.0 (W) x 183.0 (H) x 8.5 (D)	mm
Effective viewing area	215.07 (W) x 162.27(H)	mm
Dot number	(640 x 3) (W) x 480 (H)	Dots
Dot size	0.09 (W) x 0.31 (H)	mm
Dot pitch	0.11 (W) x 0.33 (H)	mm
Display color *1	White *2	-
Base color *1	Black *2	-
Weight	540	g

*1 Due to the characteristics of the LC material, the colors vary with environmental temperature.

*2 Negative-type display

Display data "H": R, G, B Dots ON: White Display data "L": R, G, B, Dots OFF: Black

4. Absolute Maximum Ratings

4.1 Electrical absolute maximum ratings

Temp. = 25°C

ITEM	SYMBOL	MIN.	MAX.	UNIT
Supply voltage for logic	VDD	0	6.0	V
Supply voltage for LCD driving	VCONT	0	VDD	V
Input signal voltage	Vin	0	VDD+0.3	V

4.2 Environmental absolute maximum ratings

ITEM	SYMBOL	MIN.	MAX.	UNIT
Operating temperature *6	Тор	0	50	°C
Storage temperature *1	Tsto	-20	60	°C
Operating humidity *2	Нор	10	85	%RH
Storage humidity *2	Hsto	10	*3	%RH
Vibration	-*4	*4	-	
Shock	-	*5	*5	-

*1 Temp. = -20°C < 24 Hr.; Temp. = 60°C < 24 Hr. No vibration and shock

*2 Non-condensing

*4

*3 Temp. $\leq 40^{\circ}$ C, 85% RH Max.

Temp. > 40°C, Absolute Humidity shall be less than 85% RH at 40°C.

Frequency	10 ~ 55 Hz	Converted to	
Vibration width	0.15 mm	$(0.03 \sim 0.91G)$	
Interval	10 - 55 - 10 H	z 1 minute	

2 hours in each direction; X, Y, & Z (6 hours total) - EIAJ ED-2531

*5 Acceleration: 50G

Pulse width:11 msec.3 times in each direction: $\pm X, \pm Y, \& \pm Z$ EIAJ ED-2531

5. Electrical Characteristics

$10110 200. 000 - 0.00 \pm 0$	Temp. = 25°C, VDD	$= 5.0V \pm 5\%$	6
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			Temp.	- 25 0, 12	JD = 3.0V	± 070
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply voltage for logic	VDD	-	4.75	5.00	5.25	V
	Vop =	0 °C	0.80	-	-	V
LCD driving voltage *1	VCONT	25 °C	1.35	1.95	2.55	V
		40 °C	-	-	2.80	V
Input voltage	Vin	"H" Level	0.8VDD	-	VDD	V
		"L" Level	0	-	0.2VDD	V
Clock frequency	fcp		4.03	4.32	18.0	MHz
Frame frequency *2	ffrm		70	75	80	Hz
Current consumption for	IDD		-	68	102	mA
logic		#3				
Power consumption	Pdisp		-	340	510	mW

- *1 Maximum contrast ratio is obtained by adjusting the LCD supply voltage (Vop = VCONT) for driving the LCD.
- *2 In consideration of display quality, it is recommended that the frame frequency is set in the range of 70-80Hz. When higher frame and clock frequencies have to be used, confirm the LCD's performance and display quality before finalizing the frequency values. Generally, as frame and clock frequencies increase, current consumption increases and display quality degrades.
- *3 Display high frequency pattern (see below). VDD = 5V, Vop = VCONT, fFRM = 75Hz, CP = 4.32MHz Pattern:



al Characteristics							
			Temp. = 25	°C	Measu	ring spot :	=
ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Response time	Rise	Tr	$\theta = \phi = 0^{\circ}$	-	160	260	ms
	Down	Tf	$\theta = \phi = 0^{\circ}$	-	80	180	ms
Viewing angle	θ	$CR \ge 2, \varphi = 0^{\circ}$	-20	-	35	deg.	
range	range		$CR \ge 2, \ \theta = 0^{\circ}$	-45	-	45	deg.
Contrast ratio		CR	$\theta = \phi = 0^{\circ}$	15.0	30.0	-	-
	Red	x	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
Chromaticity coordinates Green Blue	у	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-	
	Green	x	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
		у	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
	Blue	x	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
		у	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
	White	x	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
		У	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
	Black	x	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-
		у	$\theta = \phi = 0^{\circ}$	TBD	TBD	TBD	-

Optimum contrast is obtained by adjusting the LCD driving voltage (Vop) while at the viewing angle of $\theta = \phi = 0^{\circ}$.

6.

s: CR = Brightness all pixels "White" Brightness all pixels "Black"

6.2 Definition of viewing angle

