

# Planar Display Comparisons

*Application Note 107-01*

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*Most of the MD displays can be replaced by a new EL version. This Application Note may be used as a guide to show similarities and differences between the products. The newer designs have additional features, but are designed to fit into the same mechanical mount and be driven from the same video signal source. In each case, the respective Operation Manuals should be consulted for full specifications.*

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## EL320.256-F( )-FRA as a Replacement for MD320.256

Application Note 107(a) - See the respective manuals for the full specifications.

<b>Similarities</b>	<b>EL320.256-F( )-FRA</b>	<b>MD320.256-70E &amp; 71E</b>
Mechanical mounting	same as MD	
height and width	same as MD	
Connector and pinout	same as MD	
Video timing	same as MD	
Shock	Same spec, verified w/ different test	
Vibration	same as MD	
Temperature Range	-25...+65°C	0...+55°C
Reliability	Better than MD	
Luminance variation, time & temp, nonuniformity color	same as MD	
Average Brightness	same as MD	
Thickness	same as MD	
Weight	260 g, Essentially same as MD	280g
Humidity	same as MD	
Active Area	same as MD	
Altitude	same as MD	
Temperature	same as MD	

<b>Differences</b>	<b>EL320.256-F( )-FRA</b>	<b>MD320.256-70E &amp; 71E</b>
EMI	Below EN55022 B Careful EMI design and shielding make the F4 and F6 very quiet.	Considerable.
Frame	Internal EMI shield connects frame to logic ground	No shield
Near magnetic field	Very low Use of new design coils and transformers	Considerable
'Off' State Latent Image	Very low Symmetric panel drive along with 5 V write voltage set-back improves latent image properties.	Careful image selection needed.
Maximum video clock frequency	25 MHz High video clock frequency results in flicker-free frame rate of over 72 Hz	16.5 MHz Frame rate 64 Hz max.
Brightness control	Yes--External potentiometer or customer electronic circuitry.	No
Luminance stability with temperature	15% max	10%
Scrolling	Unacceptable	Acceptable
Input Voltage	5 & 11-30V	5 & 12; 5 & 15;
Regulatory approvals	UL1950, UL544 pending	UL544, UL478
Product improvements	Future enhancements planned in brightness, contrast and overall performance. Price/volume improvements expected	None

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## EL512.256-H3-FRB as a Replacement for MD512.256

Application Note 107(b) - See the respective manuals for the full specifications.

Similarities	EL512.256-H3-FRB	MD512.256-37, 38, 39, 39E
Mechanical mounting height and width	FRB version uses a frame similar to the MD same as MD	
Connector and pinout	Superset of MD, plug compatible-MD replacement. Some pins grounded in the MD are used. Pin 5 and 7 should be "no connects" for compatible H3 operation.	Pins 5 & 7 are GND in the MD
Video timing	Superset of MD MD mode compatible, has higher maximum clock rate Some differences exist in VS to HS timing. Check timing diagrams for details.	
Shock	Same spec, but verified with different test	
Vibration	Essentially the same except spec'd as "random" rather than "sinusoidal"	
Temperature Range	-25...+65°C	0...+55°C
Reliability	Better than MD	
Luminance variation, time and temp, nonuniformity color	same as MD	
Humidity	same as MD	
Active Area	same as MD	
Altitude	same as MD	
Temperature	Spec's same test duration 24 hrs	Spec's same test duration 24 hrs at each extreme

Differences	EL512.256-H3-FRB	MD512.256-37, 38, 39, 39E
Thickness	16.5 mm -H3 has an integrated DC/DC converter, so the thickness is less than with MD	35 mm
Frame	Mounting tabs are a different thickness. Check manuals for details	
Weight	400 g The integrated DC/DC converter has reduced the weight	650 g
EMI	Careful EMI design and shielding make the H3 very quiet. Higher bandwidth input to display may adversely effect EMI performance although the display itself is "quieter"	Considerable.
Near magnetic field	Very low Use of toroidal coils	Considerable
'Off' State Latent Image	Very low Symmetric panel drive combined w/ 5 V write voltage set-back improves latent image prop.	Careful image selection needed.
Maximum video clock frequency	30 MHz High video clock frequency results in flicker-free frame rate of over 75 Hz	15 MHz Frame rate 64 Hz max.
Brightness, contrast control	Yes--Control either with external potentiometer or customer electronic circuitry.	No
Scrolling	Unacceptable	Acceptable
Luminance stability with temperature	15% max	10%
Input Voltage	5 & 11-30V Covers all variations of the MD 512.256	5 & 12; 5 & 15; 5 & 24
Average Brightness	38.3 cd/m <sup>2</sup> @ 60Hz	43 cd/m <sup>2</sup> @ 60Hz
Regulatory approvals	UL1950, UL544 pending	UL544, UL478
Product improvements	Future enhancements planned in brightness, contrast and overall performance. Price/volume improvements expected	None
Special functions	Jumper selectable. See manual for details.	None

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## EL640.350-D4-FRA as a Replacement for MD640.350

Application Note 107(c) - See the respective manuals for the full specifications

Similarities	EL640.350-D4-FRA	MD640.350-60, 61, 62
Mechanical mounting	FRA version uses same frame as MD	
Height and width	same as MD	
Connector and pinout	Superset of MD, plug compatible-MD replacement Some pins unsued in the MD are used, if pins used differently than MD spec, problems could occur	
Video timing	Superset of MD MD mode compatible, but has higher maximum clock rate	
Shock	Same spec, but verified with different test	
Vibration	Essentially the same except spec'd as "random" rather than "sinusoidal"	
Temperature Range	-25...+65°C	0...+55°C
Reliability	Better than MD	
Luminance variation, time and temp, nonuniformity color	same as MD	
Humidity	same as MD	
Active Area	same as MD	
Altitude	same as MD	
Temperature	Spec's same test duration 24 hrs	Spec's same test duration 24 hrs at each extreme

Differences	EL640.350-D4-FRA	MD640.350-60, 61, 62
Thickness	21 mm -D4 has an integrated DC/DC converter, so the thickness is less than with MD	35 mm w/ dc/dc converter attached. 18.3mm w/out.
Near magnetic field	Very low Use of toroidal coils	Considerable
Weight	400 g The integrated DC/DC converter has reduced the weight	565 g
EMI	Below EN55022 B Careful EMI design and shielding make CB very quiet. Higher bandwidth input to display may adversely effect EMI performance although display itself is "quieter"	Considerable.
'Off' State Latent Image	Very low Symmetric panel drive combined w/ 5 V write voltage set-back improves latent image properties.	Careful image selection needed.
VGA Feature Connector compat.	Yes D4 is VGA Feature Connector compatible and supports all 350 line VGA modes.	No
Maximum video clock frequency	30 MHz High video clock frequency results in flicker-free frame rate of over 80 Hz	16.5 MHz Frame rate 64 Hz max.
Brightness, contrast control	Yes--Control either with external potentiometer or customer electronic circuitry.	No
Luminance stability with temperature	15% max	10%
Scrolling	Unacceptable	Acceptable
Input Voltage	5 & 11-30V Covers all variations of MD 640.350	5 & 12; 5 & 15; 5 & 24
Average Brightness	38.5 cd/m <sup>2</sup> @ 60Hz	37.2 cd/m <sup>2</sup> @ 60Hz
Regulatory approvals	UL1950, UL544 pending	UL544, UL478
Product improvements	Future enhancements planned in brightness, contrast and overall performance. Price/volume improvements expected	None
Frame	Internal EMI shield connects frame to logic grnd.	No shield
Special functions	Jumper selectable, See manual for details	None
V & H Positioning	Display his limited positioning in both axes	None

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**EL640.400-CB( )-FRA as a Replacement for MD640.200**

Application Note 107(d) - See the respective manuals for the full specifications

<b>Similarities</b>	<b>EL640.400-CB( )-FRA</b>	<b>MD640.200-20, 21, 22</b>
Mechanical mounting height and width	FRA version uses same frame as MD same as MD	
Connector and pinout	Superset of MD, plug compatible-MD replacement Some pins unsued in the MD are used, if pins are used differently than MD spec, problems could occur. The 200 line mode is jumper selectable.	
Video timing	Superset of MD MD mode compatible, but has higher maximum clock rate	
Shock	Same spec, but verified with different test	
Vibration	Essentially the same except spec'd as "random" rather than "sinsuoidal"	
Temperature Range	0...+55°C	0...+55°C
Humidity	same as MD	
Altitude	same as MD	
Active Area	same as MD	
Reliability	Better than MD	
Luminance variation, time and temp, nonuniformity color	same as MD	
Temperature	Spec's same test duration 24 hrs	Spec's same test duration 24 hrs at each extreme

<b>Differences</b>	<b>EL640.400-CB( )-FRA</b>	<b>MD640.200-20, 21 &amp; 22</b>
Thickness	21 mm -CB has an integrated DC/DC converter, so the thickness is 14 mm smaller than with MD	35 mm w/ dc/dc converter attached. 18.3mm w/out dc/dc converter attached.
Weight	400 g lntegrated DC/DC converter has reduced the weight	555 g
EMI	Below EN55022 B Careful EMI design and shielding make the CB very quiet. Higher bandwidth input to display may adversely effect EMI performance although the display itself is "quieter"	Considerable.
Near magnetic field	Very low Use of toroidal coils	Considerable
'Off' State Latent Image	Very low Symmetric panel drive combined with 5 V write voltage set-back improves the latent image properties.	Careful image selection needed.
VGA Feature Connector compatibility	Yes The CB( ) is VGA Feature Connector compatible and supports all 200, 350 and 400 line VGA modes.	No
Maximum video clock frequency	30 MHz High video clock frequency results in flicker-free frame rate of over 70 Hz	16.5 MHz Frame rate 72 Hz max.
Brightness control	Yes--Control either with external potentiometer or customer electronic circuitry.	No
Scrolling	Unacceptable	Acceptable
Luminance stability with temperature	15% max	10%
Input Voltage	5 & 12; 5 & 24 (C-3 has 5 & 15 capability)	5 & 12; 5 & 15; 5 & 24
Average Brightness	39.5 cd/m <sup>2</sup> @ 60Hz	44.2 cd/m <sup>2</sup> @ 60Hz
Regulatory approvals	UL1950, UL544 pending	UL544, UL478
Product improvements	Future enhancements planned in brightness, contrast, performance. Price/volume improvements expected	None
Frame	Internal EMI shield connects frame to logic ground	No shield
Special functions	Jumper selectable	None

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## EL640.400-CB( )-FRA as a Replacement for MD640.400

Applications Note 107(e) - See the respective manuals for the full specifications.

Similarities	EL640.400-CB( )-FRA	MD640.400-50, 52, 54
Mechanical mounting height and width	FRA version uses same frame as MD same as MD	
Connector and pinout	Superset of MD, plug compatible-MD replacement Some pins unused in the MD are used, if pins are used differently than MD spec, problems could occur	
Video timing	Superset of MD MD mode compatible, but has higher maximum clock rate	
Shock	Same spec, but verified with different test	
Vibration	Essentially the same except spec'd as "random" rather than "sinusoidal"	
Temperature Range	0...+55°C	0...+55°C
Reliability	Better than MD	
Luminance variation, time and temp, nonuniformity color	same as MD	
Humidity	same as MD	
Active Area	same as MD	
Altitude	same as MD	
Temperature	Spec's same test duration 24 hrs	Spec's same test duration 24 hrs at each extreme

Differences	EL640.400-CB( )-FRA	MD640.400-50, 52, 54
Thickness	21 mm -CB has an integrated DC/DC converter, so the thickness is 14 mm smaller than with MD	35 mm w/ dc/dc converter attached. 18.3mm without dc/dc converter attached.
Weight	400 g Integrated DC/DC converter reduced weight	565 g
EMI	Below EN55022 B Careful EMI design and shielding make the CB very quiet. Higher bandwidth input to display may adversely effect EMI performance although the display itself is "quieter"	Considerable.
Near magnetic field	Very low Use of toroidal coils	Considerable
'Off' State Latent Image	Very low Symmetric panel drive combined with 5 V write voltage set-back improves the latent image properties.	Careful image selection needed.
VGA Feature Connector compatibility	Yes The CB( ) is VGA Feature Connector compatible and supports all 200, 350 and 400 line VGA modes.	No
Maximum video clock frequency	30 MHz High video clock frequency results in flicker-free frame rate of over 70 Hz	16.5 MHz Frame rate 62 Hz max.
Brightness control	Yes--Control either with external potentiometer or customer electronic circuitry.	No
Luminance stability with temperature	15% max	10%
Scrolling	Unacceptable	Acceptable
Input Voltage	5 & 12; 5 & 24 (C-3 has 5 & 15 capability)	5 & 12; 5 & 15; 5 & 24
Average Brightness	39.5 cd/m <sup>2</sup> @ 60Hz	45 cd/m <sup>2</sup> @ 60Hz
Regulatory approvals	UL1950, UL544 pending	UL544, UL478
Product improvements	Future enhancements planned in brightness, contrast and overall performance. Price/volume improvements expected	None
Frame	Internal EMI shield connects frame to logic ground	No shield
Special functions	Jumper selectable	None

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