

Designing Expansion Boards for the Motorola MPC555EVB/ETAS ES200

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1 Introduction

The Motorola MPC555EVB/ETAS ES200 evaluation board was designed with multiple interfaces to allow flexibility for expansion. There are three sets of connectors for expansion. The MAPI-400+100 is on the bottom side of the board and has access to all signals required to interface to a user application board. The host communication expansion (HCE) connectors allow access to the bus of the MPC555. The customized communication expansion (CCE) allows access to some of the MPC555 on-chip communication ports. The HCE and the CCE are on the top side of the EVB555.

2 The Host Communication Expansion Connector (HCE)

The host communication expansion connectors on the EVB555 are designed for use as an expansion of the external bus of the MPC555. They could be used to add additional memory or additional peripherals. There are two 60-pin connectors (CO106 – A and CO107 – B) part number Samtec TFM-130-12-S-D-P. The matching connector required on the expansion board is SFM-130-02-S-D-P. The pin-out of the HCE is shown in [Table 1](#). The two connectors are mounted on 1.8 inch (45.72 mm) centers. This allows for a board of approximately three square inches.

NOTE

An ETAS ETK interface may be mounted above the HCE board. The total height (including the connectors on the EVB555 and all components on the HCE board) must be below 0.6875 inches to allow clearance of the ETK board.

2.1 Memory Chips On The HCE

All 32 bits of the MPC555 data bus are available on the HCE connectors. Memory boards designed for these connectors should use all 32 bits for the best performance. On a full-featured board, utilizing memories less than 32 bits wide, the memory can be implemented with multiple chips. For 16-bit wide memories, two chips should be used. Provisions should be made on the expansion board to allow the second memory to be disabled to allow for smaller bus widths on the EVB555. 16-bit only memories should be connected to D0-D15 of the data bus. $\overline{CS}[2]$ is available for use on the HCE board. If non-volatile memories are used, $\overline{CS}[0]$ could also be used to allow for booting from the external memory. (It is not possible to boot from the Texas Instruments TMS28F033 on the EVB555.) If $\overline{CS}[0]$ is used, the TMS28F033 can be disabled by using the $\overline{SGF_SEL}$ signal on pin 160 of the ETK connector (CO508). A logic high (default) enables the EVB555 on-board external flash memory. In addition, \overline{CS}_{HCE} could be used if the chip timing is the same as used by the memory on the EVB555 and can fit in a 1-Mbyte memory size.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

2.2 Peripherals On The HCE

Peripherals can also be added on to the HCE bus. Chip selects $\overline{CS}[2]$ and $\overline{CS}[3]$ are available on the HCE connectors. In addition, \overline{CSHCE} could be used if the chip timing is the same as used by the memory on the EVB555 and can fit in a 1-Mbyte memory size. Peripherals that could be added include more serial ports, an ethernet adapter, or USB circuitry.

Table 1 Host Communication Expansion Connector

A (CO106)			B (CO107)			PIN NAME		
PIN NAME			PIN NAME			VCC3_3	1	•
VCC3_3	1	•	VCC3_3	2	•	VCC3_3	1	•
VCC[5]	3	•	VCC[5]	4	•	VCC5	3	•
SDATA[31]	5	•	SDATA[30]	6	•	SADDR[31]	5	•
SDATA[29]	7	•	SDATA[28]	8	•	SADDR[29]	7	•
SDATA[27]	9	•	SDATA[26]	10	•	SADDR[27]	9	•
SDATA[25]	11	•	SDATA[24]	12	•	SADDR[25]	11	•
SDATA[23]	13	•	SDATA[22]	14	•	SADDR[23]	13	•
SDATA[21]	15	•	SDATA[20]	16	•	SADDR[21]	15	•
SDATA[19]	17	•	SDATA[18]	18	•	SADDR[19]	17	•
SDATA[17]	19	•	SDATA[16]	20	•	SADDR[17]	19	•
SDATA[15]	21	•	SDATA[14]	22	•	SADDR[15]	21	•
SDATA[13]	23	•	SDATA[12]	24	•	SADDR[13]	23	•
SDATA[11]	25	•	SDATA[10]	26	•	SADDR[11]	25	•
SDATA[9]	27	•	SDATA[8]	28	•	SADDR[9]	27	•
SDATA[7]	29	•	SDATA[6]	30	•	GND	29	•
SDATA[5]	31	•	SDATA[4]	32	•	N/C	31	•
SDATA[3]	33	•	SDATA[2]	34	•	$\overline{CS}[0]$	33	•
SDATA[1]	35	•	SDATA[0]	36	•	$\overline{CS}[2]$	35	•
GND	37	•	GND	38	•	\overline{OE}	37	•
N/C	39	•	N/C	40	•	N/C	39	•
$\overline{WE}/AT[0]$	41	•	$\overline{WE}/AT[1]$	42	•	BURST	41	•
$\overline{WE}/AT[2]$	43	•	$\overline{WE}/AT[3]$	44	•	TP113	43	•
N/C	45	•	N/C	46	•	\overline{TA}	45	•
TSIZ1	47	•	TSIZ0	48	•	\overline{TS}	47	•
N/C	49	•	N/C	50	•	TP114	49	•
PORESET	51	•	SRESET	52	•	$\overline{BB}/VF[2]/IWP[3]$	51	•
N/C	53	•	TP108	54	•	$\overline{BG}/VF[0]/LWP[1]$	53	•
TP109	55	•	TP110	56	•	CLKOUT	55	•
TP111	57	•	TP112/ \overline{DIS}^1	58	•	TP116	57	•
GND	59	•	GND	60	•	GND	59	•
						GND	60	•

NOTES:

- EVB555 boards (revision 1.1/1.2) can be modified by connecting pin 58 (TP112) to pin 78 (\overline{DIS}) of the TI Flash (IC400). This allows the TI Flash to be disabled and $\overline{CS}[0]$ to be useable by other devices. TP112 can then be pulled to ground through a $2K\Omega$ resistor. In addition, pin 6 of IC403 (/SGEOF) should be connected to pin 17 of RN303, a spare pullup resistor, to prevent the floating input of IC403.

NOTE: these changes disable the external reset configuration word drivers on the EVB555 and may cause limitations with the ETAS ETK.

2.3 HCE Board Dimensions

Figure 1 and **Table 2** show the maximum board dimensions for boards designed to interface to the HCE connectors. Surface mount components should be used to keep the total height of the HCE board and connectors to 0.6875 inches (17.46 mm) to avoid interference with the optional ETAS ETK interface.

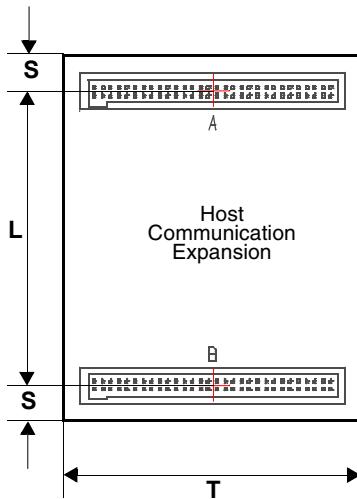


Figure 1 HCE Board Layout

Table 2 HCE Board Dimensions

Dimension	Millimeters	Inches
L	45.72	1.800
S	6.35	0.250
T	44.45	1.75

3 The Customized Communication Expansion Connectors (CCE)

The customized communication expansion connectors on the EVB555 allows access to the MPC555 on-chip communication ports. The EVB555 provides for RS-232 drivers and DB9 connector for the SCI1 channel of the MPC555. The CCE allows for customized connections to all of the MPC555 QSMCM and TouCAN interfaces. There are two 20-pin connectors (CO104 – A and CO105 – B) part number Samtec TFM-110-12-S-D-P. The matching connector required on the expansion board is SFM-110-02-S-D-P. The pin-out of the CCE is shown in **Table 3**.

NOTE

The TXD1 and RXD1 are, by default, connected to the on board RS-232 driver. These can optionally be brought to the TXD_CCE (7) and RXD_CCE (8) pins of connector CO105 by changing the position of the 0Ω resistors on BR100 and BR101 from position 1-2 to position 2-3.

Table 3 Customized Communication Expansion Connector

A (CO104)			B (CO105)			PIN NAME		
VCC3_3	1	•	VCC3_3	1	•	2	VCC3_3	
VCC5	3	•	VCC5	3	•	4	VSTBY3_3	
N/C	5	•	CLKOUT	5	•	6	N/C	
B_CNTX0	7	•	B_CNRX0	7	•	8	RXD_CCE	
TP100	9	•	TP101	9	•	10	TP104	
GND	11	•	GND	11	•	12	GND	
A_CNTX0	13	•	A_CNRX0	13	•	14	TP106	
TP102	15	•	TP103	15	•	16	RXD2	
SRESET	17	•	PORESET	17	•	18	TP118	
GND	19	•	GND	19	•	20	GND	
	20							

3.1 CCE Board Dimensions

Figure 2 and **Table 4** show the maximum board dimensions for boards that attach the EVB555 CCE connector.

NOTE

Boards can extend off of the EVB for connectors. It is recommended that mounting hardware be supplied to attach the CCE board to the EVB.

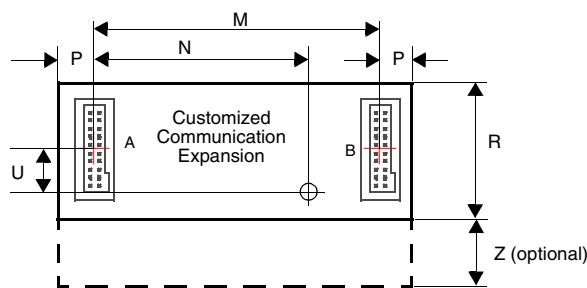


Figure 2 CCE Board Size

Table 4 CCE Board Dimensions

Dimension	Millimeters	Inches
M	44.45	1.750
N	32.385	1.275
U	6.35	0.25
P	6.35	0.250
R	22.23	0.875
Z	12.7	0.50

4 The MAPI-400+100 Connectors

The MAPI-400+100 is an extension of the Motorola MAPI-400 interface that is used on the Motorola M•Core products. An additional 100 pin connector was added to support the additional general purpose Input/Output pins from the Port Replacement Unit of the EVB555.

NOTE

Boards designed to interface to M•Core MAPI-400 boards may not work with the EVB555.

Use of the MAPI-400 signals on the EVB555 is described in the ETAS [**EVB555 Quick Reference Guide**](#).

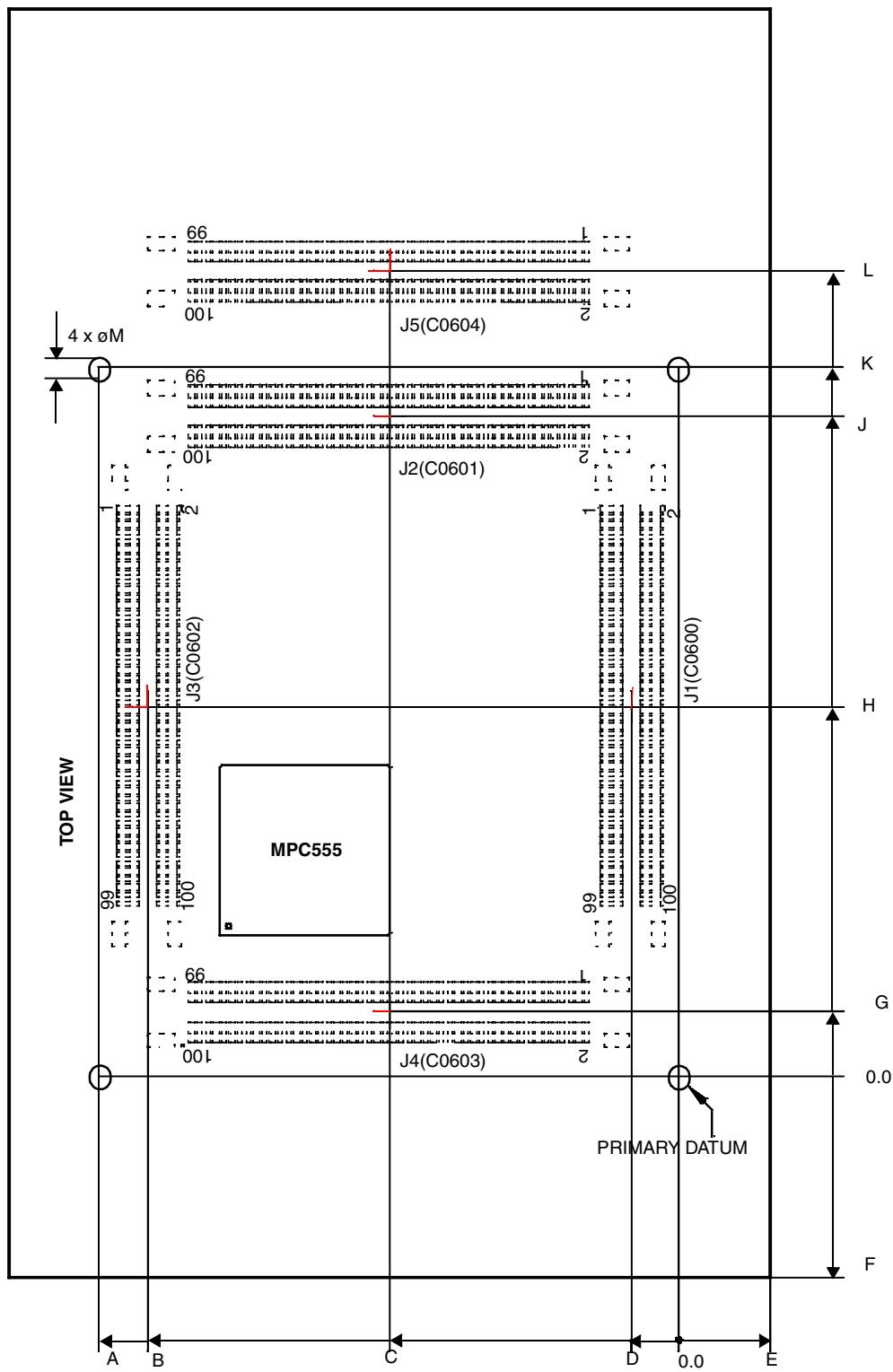


Figure 3 MAPI-400+100 Footprint

Table 5 MAPI-400+100 Dimensions

Dimension	Millimeters	Inches
A	91.45	3.60
B	83.82	3.300
C	45.72	1.800
D	7.62	0.300
E	14.22	0.560
F	31.78	1.250
G	10.16	0.400
H	58.42	2.300
J	104.14	4.100
K	111.76	4.400
L	127.00	5.000
M	3.20	0.126

Table 6 MAPI-400 Signal Definitions

J1 (CO600)		J2 (CO601)	
PIN NAME	PIN NAME	PIN NAME	PIN NAME
AAN[51]/PQB[7]	1 • • 2		1 • • 2 AAN50_PQB6
AAN[52]/PQA[0]	3 • • 4		3 • • 4 AAN49_PQB5
AAN[53]/PQA[1]	5 • • 6		5 • • 6 AAN48_PQB4
AAN[54]/PQA[2]	7 • • 8		7 • • 8 AAN3_PQB3
AAN[55]/PQA[3]	9 • • 10		9 • • 10 AAN2_PQB2
AAN[56]/PQA[4]	11 • • 12		11 • • 12 AAN1_PQB1
AAN[57]/PQA[5]	13 • • 14		13 • • 14 AAN0_PQB0
AAN[58]/PQA[6]	15 • • 16		15 • • 16
AAN[59]/PQA[7]	17 • • 18	Ground	17 • • 18 Ground
	19 • • 20		19 • • 20
	21 • • 22	MDA11	21 • • 22 MDA12
	23 • • 24	MDA13	23 • • 24 MDA14
	25 • • 26	MDA15	25 • • 26 MDA27
A_TPUC[0]	27 • • 28	MDA28	27 • • 28 MDA29
A_TPUC[1]	29 • • 30	MPWM[0]	29 • • 30 HRESETB
A_TPUC[2]	31 • • 32	MPWM[1]	ETRIG1 31 • • 32 EXTCLK
A_TPUC[3]	33 • • 34	MPWM[2]	ETRIG2 33 • • 34 BBB_IWP3
A_TPUC[4]	35 • • 36	MPWM[3]	BDIP 35 • • 36 BGB_LWP1
A_TPUC[5]	37 • • 38	MPWM[16]	BIB_STSB 37 • • 38 BRB_IWP2
A_TPUC[6]	39 • • 40	MPWM[17]	BURSTB 39 • • 40 SGP_IRQOUTB
Ground	41 • • 42	MPWM[18]	TSB 41 • • 42 EPEE
A_TPUC[7]	43 • • 44	MPWM[19]	Ground 43 • • 44
A_TPUC[8]	45 • • 46	ECK	45 • • 46 Ground
A_TPUC[9]	47 • • 48	RXD1_QGPI	47 • • 48 ENGCLK/BUCLK
A_TPUC[10]	49 • • 50	RXD2_QGPI	49 • • 50 TXD1_QGPO
A_TPUC[11]	51 • • 52	A_TPUC[15]	51 • • 52 TXD2_QGPO
A_TPUC[12]	53 • • 54	A_T2CLK	
A_TPUC[13]	55 • • 56		53 • • 54
A_TPUC[14]	57 • • 58		55 • • 56
	59 • • 60		57 • • 58
IRQ[1]/SGP	61 • • 62	IRQ[0]/SGP	59 • • 60 MPIO9
IRQ[3]/SGP	63 • • 64	IRQ[2]/SGP	61 • • 62 MPIO11
IRQ[5]/SGP	65 • • 66	IRQ[4]/SGP	63 • • 64 Ground
IRQ[7]/mck3	67 • • 68	IRQ[6]/mck2	65 • • 66 MPIO5
	69 • • 70		67 • • 68 MPIO7
Ground	71 • • 72		69 • • 70 MPIO9
	73 • • 74	Ground	71 • • 72 MPIO11
	75 • • 76		73 • • 74 MPIO13
	77 • • 78		75 • • 76 MPIO15
	79 • • 80		77 • • 78
	81 • • 82		79 • • 80
	83 • • 84	Ground	81 • • 82
	85 • • 86		83 • • 84 Ground
	87 • • 88		85 • • 86
Ground	89 • • 90		87 • • 88 BAN0_PQB0
	91 • • 92	Ground	89 • • 90 BAN1_PQB1
	93 • • 94		91 • • 92 BAN2_PQB2
	95 • • 96		93 • • 94 BAN3_PQB3
	97 • • 98		95 • • 96 BAN48_PQB4
	99 • • 100	VPP	97 • • 98 BAN49_PQB5
			99 • • 100 BAN50_PQB6

Table 7 MAPI-400 Signal Definitions

PIN NAME	J3 (CO602)		PIN NAME	J4 (CO603)		PIN NAME
1	•	•	2	BAN51_PQB7	1	•
3	•	•	4	BAN52_PQA0	3	•
5	•	•	6	BAN53_PQA1	5	•
7	•	•	8	BAN54_PQA2	7	•
9	•	•	10	BAN55_PQA3	9	•
11	•	•	12	BAN56_PQA4	11	•
13	•	•	14	BAN57_PQA5	13	•
15	•	•	16	BAN58_PQA6	15	•
17	•	•	18	BAN59_PQA7	17	•
19	•	•	20		19	•
21	•	•	22		21	•
23	•	•	24		23	•
Ground	25	•	26	B_TPUCH0	25	•
A_CNRX0	27	•	28	B_TPUCH1	27	•
A_CNTX0	29	•	30	B_TPUCH2	29	•
	31	•	32	B_TPUCH3	31	•
B_CNRX0	33	•	34	B_TPUCH4	33	•
B_CNTX0	35	•	36	B_TPUCH5	35	•
	37	•	38	B_TPUCH6	37	•
SCK_QGP6	39	•	40	B_TPUCH7	39	•
MISO_QGP4	41	•	42	B_TPUCH8	41	•
Ground	43	•	44	B_TPUCH9	43	•
MOSI_QGP5	45	•	46	B_TPUCH10	45	•
PCS0_QGP	47	•	48	B_TPUCH11	47	•
	49	•	50	B_TPUCH12	49	•
PCS1QGP	51	•	52	B_TPUCH13	51	•
PCS2QGP	53	•	54	B_TPUCH14	53	•
	55	•	56	B_TPUCH15	55	•
PCS3QGP	57	•	58	B_T2CLK	57	•
	59	•	60		59	•
	61	•	62	VF0_MPIO0	61	•
	63	•	64	VF1_MPIO1	63	•
Ground	65	•	66	VF2_MPIO2	65	•
VFLS0_MPIO3	67	•	68	Ground	67	•
VFLS1_MPIO4	69	•	70		69	•
IWP0_VFLS	71	•	72		71	•
IWP1_VFLS	73	•	74		73	•
	75	•	76		75	•
PORESETB	77	•	78		77	•
	79	•	80	TDO_DSDO	79	•
Ground	81	•	82	TDI_DSDI	81	•
TMS	83	•	84		83	•
TCK_DSCK	85	•	86	TSIZ0	85	•
TRST_B	87	•	88	TSIZ1	87	•
SRESET	89	•	90	RSTCONF/TEXP	89	•
Ground	91	•	92		91	•
	93	•	94	FRZ_PTR	93	•
Ground	95	•	96		95	•
Ground	97	•	98		97	•
	99	•	100		99	•

Table 8 MAPI-400 +100 PRU Extended Signal Definitions

J5 (CO605)			
PIN NAME	1	2	PIN NAME
B_PIO0	•	•	A_PIO0
B_PIO1	•	•	A_PIO1
B_PIO2	•	•	A_PIO2
B_PIO3	•	•	A_PIO3
B_PIO4	•	•	A_PIO4
B_PIO5	•	•	A_PIO5
B_PIO6	•	•	A_PIO6
Ground	•	•	Ground
B_PIO7	•	•	A_PIO7
B_PIO8	•	•	A_PIO8
B_PIO9	•	•	A_PIO9
B_PIO10	•	•	A_PIO10
B_PIO11	•	•	A_PIO11
Ground	•	•	Ground
B_PIO12	•	•	A_PIO12
B_PIO13	•	•	A_PIO13
B_PIO14	•	•	A_PIO14
B_PIO15	•	•	A_PIO15
B_PIO16	•	•	A_PIO16
Ground	•	•	Ground
B_PIO17	•	•	A_PIO17
B_PIO18	•	•	A_PIO18
B_PIO19	•	•	A_PIO19
B_PIO20	•	•	A_PIO20
B_PIO21	•	•	A_PIO21
B_PIO22	•	•	A_PIO22
B_PIO23	•	•	A_PIO23
B_PIO24	•	•	A_PIO24
Ground	•	•	Ground
B_PIO25	•	•	A_PIO25
B_PIO26	•	•	A_PIO26
B_PIO27	•	•	A_PIO27
B_PIO28	•	•	A_PIO28
B_PIO29	•	•	A_PIO29
B_PIO30	•	•	A_PIO30
B_PIO31	•	•	A_PIO31
	•	•	73
Ground	•	•	74
	•	•	75
	•	•	76
	•	•	77
	•	•	78
	•	•	79
	•	•	80
Ground	•	•	81
/EXTBUS	•	•	82
	•	•	83
	•	•	84
	•	•	85
	•	•	86
	•	•	87
Ground	•	•	88
Ground	•	•	89
Ground	•	•	90
Ground	•	•	91
Ground	•	•	92
UB2	•	•	93
UB2	•	•	94
UB2	•	•	95
UB2	•	•	96
UB2	•	•	97
UB2	•	•	98
UB2	•	•	99
			100

5 Lauterbach Trace Connector

The MPC555EVB includes a 64-pin connector to allow trace tools, such as Lauterbach's Trace-32, a simple connection to the signals required for trace.

Table 9 Lauterbach Universal MPC500/800 Family Trace Adapter Connector

CO500			
PIN NAME	1	2	PIN NAME
ADDR20	.	.	ADDR21
ADDR11	3	.	ADDR22
ADDR19	5	.	ADDR23
ADDR18	7	.	ADDR24
ADDR17	9	.	ADDR12
DATA11	11	.	ADDR13
RD_ <u>WR</u>	13	.	ADDR14
DATA8	15	.	ADDR15
VCC3_3	17	.	ADDR16
DATA3	19	.	<u>WE_AT2</u>
DATA2	21	.	IRQOUT_LWP0
DATA1	23	.	<u>WE_AT3</u>
DATA0	25	.	<u>BR_VF1_IWP2</u>
VCC5	27	.	DATA10
<u>WE_AT0</u>	29	.	DATA9
GND	31	.	IWP0_VFLS0
CLKOUT	33	.	IWP1_VFLS1
<u>WE_AT1</u>	35	.	<u>BG_VF0_LWP1</u>
DATA7	37	.	<u>BB_VF2_LWP3</u>
DATA6	39	.	ADDR10
DATA5	41	.	ADDR9
GND	43	.	ADDR8
DATA4	45	.	<u>BI_STS</u>
ADDR26	47	.	TS
ADDR29	49	.	<u>FRZ_PTR</u>
ADDR30	51	.	VFLS0_MPIO3
ADDR27	53	.	VFLS1_MPIO4
ADDR31	55	.	VF1_MPIO1
ADDR28	57	.	VF0_MPIO0
ADDR25	59	.	VF2_MPIO2
RSTCONF	61	.	<u>IRQ3_KR</u>
HRESET	63	.	<u>IRQ4_AT2</u>

6 Mounting Holes

Figure 4 shows the mounting holes available to mount the EVB555 to other boards. Table 10 shows the dimensions of the connectors on the top side of the board.

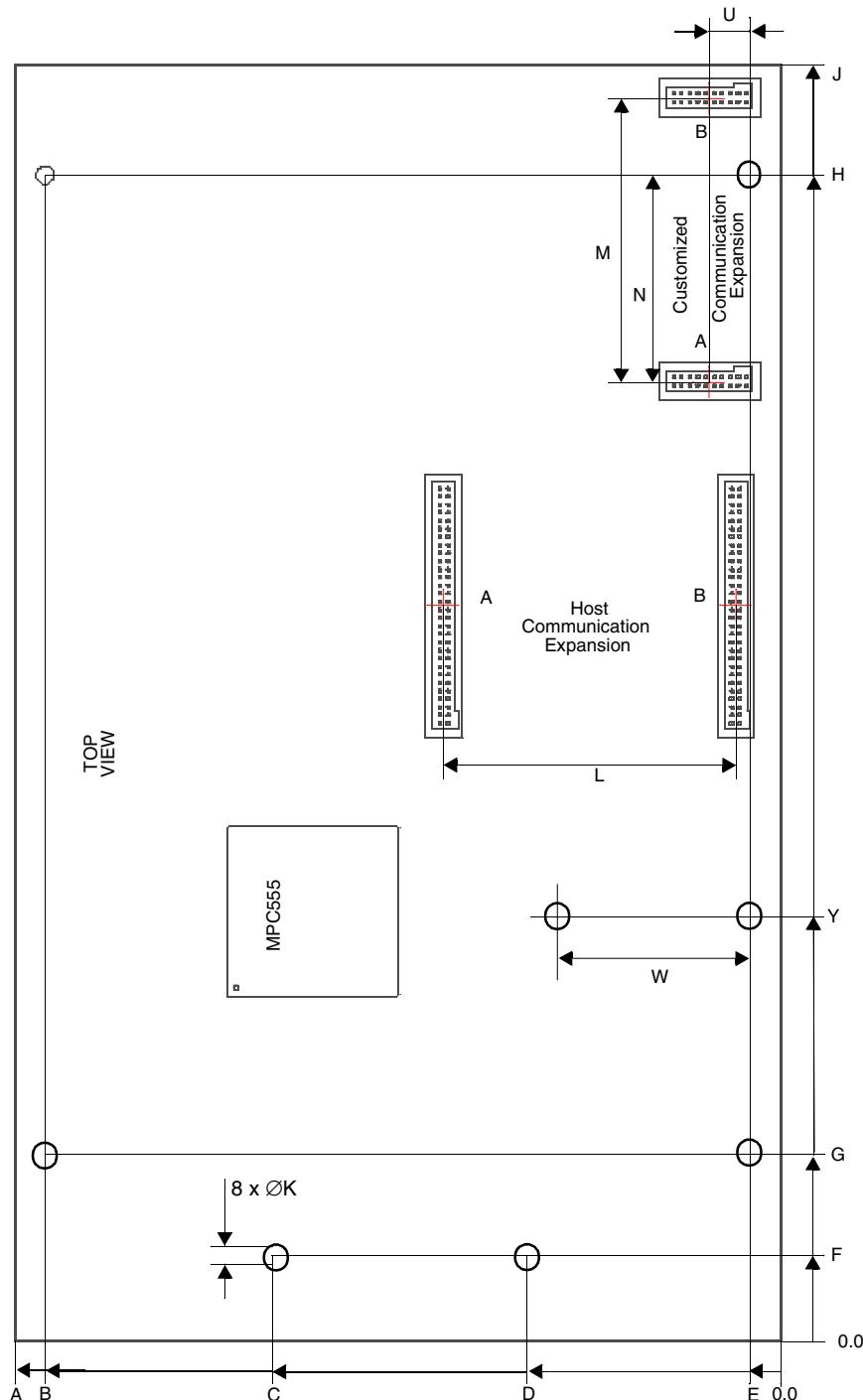


Figure 4 Mounting Holes and Top-Side Connector Dimensions

Table 10 Top Dimensions

Dimension	Millimeters	Inches
A	120.00	4.724
B	115.19	4.535
C	79.63	3.135
D	39.63	1.560
E	4.70	0.185
F	13.34	0.525
G	29.22	1.150
H	182.89	7.200
J	200.00	7.874
K	2.80	0.110
L	45.72	1.800
M	44.45	1.750
N	32.385	1.275
U	6.35	0.250
W	32.39	1.275
Y	66.675	2.625

7 Keep-Out Areas

All of the connectors on the top side of the EVB555 have keep-out areas associated with them to accommodate any board that could be connected to the expansion connectors. [Figure 5](#) shows the various keep-out areas.

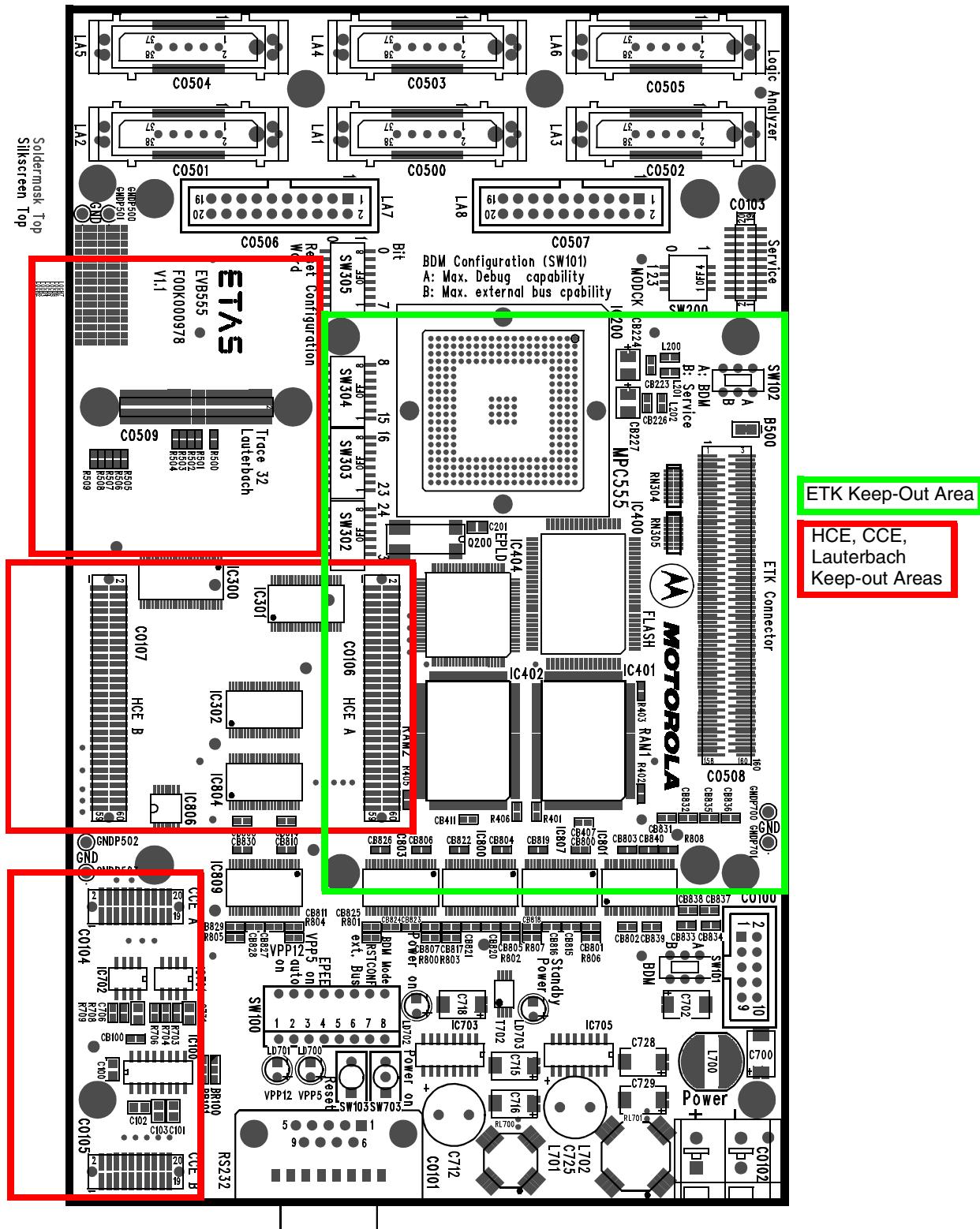


Figure 5 Expansion Board Keep-Out Areas

8 Summary of Connectors

Table 11 shows the number and types of each kind of user extension connectors on the EVB555. Shown are the part numbers for the connectors on the EVB555 and the part numbers for connectors that are required for a user board.

Table 11 Summary Of Connectors

Connector	Number of Connectors on Board	EVB555 Connector Part Number	User Board Connector Part Number (Surface Mount)	User Board Connector Part Number (Through Hole)
<i>CO100</i> Background Debug Mode Interface	1 each	3M 925320-01-10-10	3M 8510-4500 JL (board mount)	3M CHG-2010-J01010-KCP (wire mount)
<i>CO104/CO105</i> Customized Communication Expansion	2 each	Samtec TFM-110-12-S-D-P	Samtec SFM-110-02-S-D-P	
<i>CO106/CO107</i> Host Communication Expansion	2 each	Samtec TFM-130-12-S-D-P	Samtec SFM-130-02-S-D-P	
<i>CO500-505</i> Micror Digital Logic Analyzer	6 each	AMP 767 004 product code 2429		
<i>CO506/CO507</i> Analog Logic Analyzer	2 each	3M 925320-01-20-10	3M 8520-4500 (board mount)	3M CHG-2020-J01010-KCP (wire mount)
<i>CO509</i> Lauterbach Interface	1 each	Samtec FTE-132-02-G-DV-P	Samtec CLE-132-01-G-DV-P	
<i>CO600-604</i> MAPI-400+100	5 each	Robinson Nugent P50L-100 S-BS-TGF	Robinson Nugent P50L-100 P-AS-TGF	

9 Reference

For more information see the following reference material.

9.1 MPC555 User's Manual

The [MPC555 User's Manual \(MPC555UM/AD\)](#) is available from Motorola and describes the MPC555 device. The URL for the Motorola website is <http://www.mcu.motsps.com/lit/mpc.html>.

9.2 EVB555

[MPC555 Evaluation Board Quick Reference, ETAS](#)

9.3 SAMTEC Connectors

Samtec has board layout recommendations and specifications for all of their connectors available on-line. The URL for this website is <http://www.samtec.com>.

9.4 Robinson Nugent Connector

Further information on the Robinson Nugent connectors is available on-line. The URL for this website is <http://www.robinsonnugent.com>. At that site, search for P50L connectors.

9.5 Lauterbach

More information on the Lauterbach real-time trace module is available on-line. The URL for this website is <http://www.lauterbach.de>.

10 Revision History

Table 12 Revision History

Release Number	Date	Author	Sections Affected	Summary of Changes
1	31 July 01	Randy Dees	Table 5	Added dimension A to Table 5 . Renamed dimension I in Table 5 to agree with Figure 3 .

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