

APPENDIX J PART AND ASSEMBLY DRAWINGS

100 – Top Level Assembly

101 – Top Level Assembly Exploded

102 – Chassis Mount Spacer A

103 – Chassis Mount Spacer B

104 – Chassis Mount Spacer C

105 – M4 x 07 14 MM Socket Screw

106 – M4 x 0.7 Nut

107 – M4 x 0.7 22 MM Socket Screw

108 – M4 x 0.7 10 MM Socket Screws

200 – Front Motor Block Assembly

201 – Front Motor Block Assembly Exploded

202 – Front Suspension Mount Drawing

203 – Front Bottom Chassis Mount Drawing

204 – Front Top Chassis Mount Drawing

205 – Steering Post Dowel Drawing

206 – Left Steering Bell crank

207 – Right Steering Bell crank

208 – M3 x 0.5 6mm Socket Screw

209 - M3 x 0.5 12mm Socket Screw

211 – Steering Linkage Drawing

212 – M4 x 0.7 6mm Shoulder

213 – Small Steering Turnbuckle

220 – Front Right Motor Block Assembly

221 – Front Right Traxxas Assembly241

222 – Front Right Motor Housing Drawing

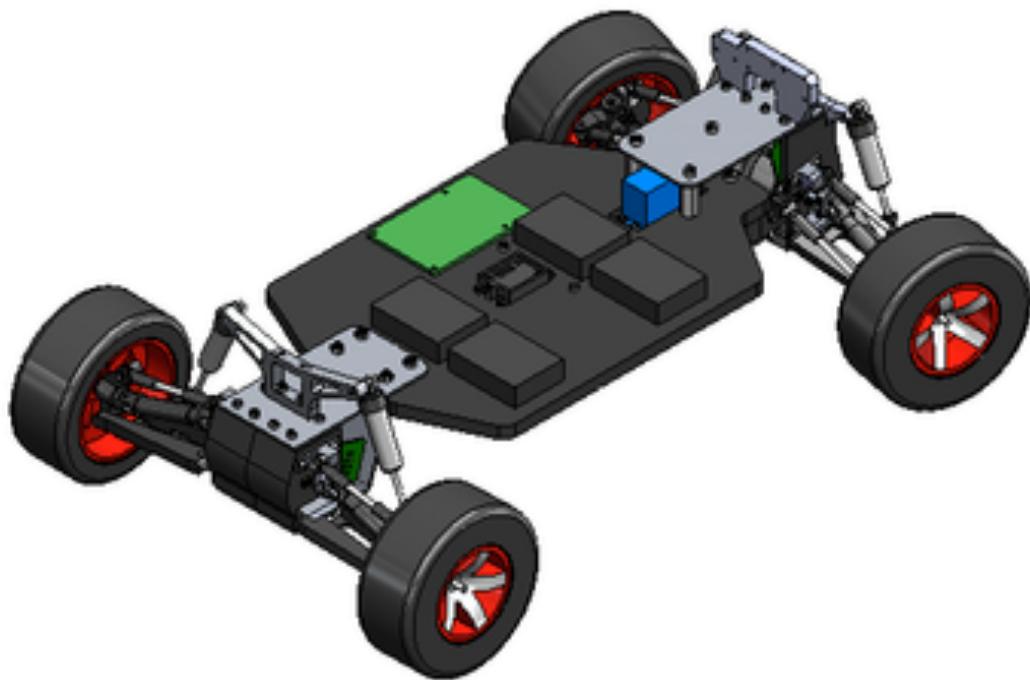
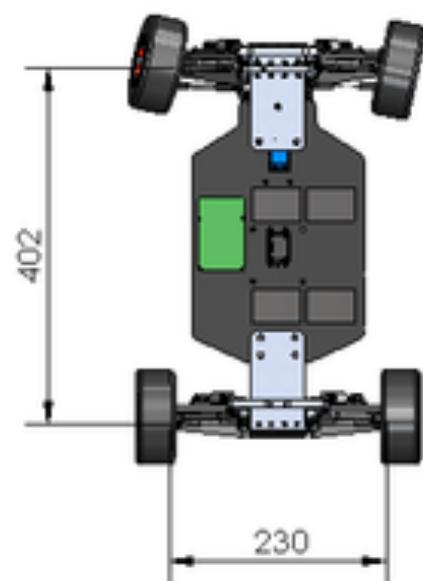
223 - Front Turnbuckle Mount Drawing

224 – Front A-Arm Mount Drawing

225 – Shaft Coupler Assembly

- 225A** – Shaft Coupler A Drawing
- 225B** – Shaft Coupler B Drawing
- 226** – Maxon Motor Data Sheet
- 227** – M3 x 0.5 4mm Flat Screw
- 228** – M2 x 0.4 12mm Socket Screw
- 229** – M3 x 0.5 5mm Rounded Screw
- 230** – M3 X 0.5 14mm Rounded Screw
- 240** – Front Left Motor Block Assembly
 - 241** - Front Left Traxxas Assembly
 - 242** – Front Left Motor Housing Drawing
- 300** – Rear Motor Block Assembly
 - 301** - Rear Motor Block Assembly Exploded
 - 302** – Rear Suspension Mount Drawing
 - 303** – Rear Bottom Chassis Mount Drawing
 - 304** – Rear Top Chassis Mount Drawing
- 310** – Rear Right Motor Block Assembly
 - 311** – Rear Right Motor Housing Drawing
 - 312** – Rear Right Traxxas Assembly
 - 314** - Rear Turnbuckle Mount Drawing
 - 315** – Rear A-Arm Mount Drawing
- 320** – Rear Left Motor Block Assembly
 - 321** – Rear Left Motor Housing Drawing
 - 322** – Rear Left Traxxas Assembly
- 400** – Chassis Assembly
 - 401** – Chassis Drawing
 - 402** – Traxxas Servo
 - 403** – Traxxas Receiver
 - 404** – Maxon Motor Driver Datasheet
 - 405** – IMU Datasheet
 - 406** – Pi Camera Datasheet

- 407** – Ultrasonic Distance Sensor Datasheet
- 408** – Raspberry Pi Datasheet
- 409** – Battery Datasheet
- 410** – Battery Plate
- 411** – 45 MM Hex Standoff
- 412** – Sensor Array
- 413** – IMU Mount
- 414** – Traxxas Battery Cage
- 415** – M3 X 0.5 14mm Flat
- 416** – Laser Rangefinder Datasheet
- 420** – Motherboard Schematic
 - 421** – Motherboard Layout
 - 422** – Teensy 3.6 Datasheet
 - 423** – Voltage Regulator Datasheet
 - 424** – CAN Transceiver Datasheet
 - 425** – Indicator LED Datasheet
 - 426** – Power LED Datasheet
 - 427** – Schottky Diode Datasheet
 - 428** – Screw Terminal Datasheet
 - 429** – Male Header Datasheet
 - 430** – Female Header Datasheet
 - 431** – LittleFuse Datasheet
- 450** – Cabling Diagram
 - 451** – Minifit Jr Receptacle
 - 452** – Minifit Jr Crimp Receptacle
 - 453** – Microfit 3.0 Receptacle
 - 454** – Microfit 3.0 Crimp Receptacle
 - 455** – Clik-Mate 1.5
 - 456** – Clik-Mate 1.5 Crimp Pin



SCALE: 1:4

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .5
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



CAL POLY
SAN LUIS OBISPO

MATERIAL:

VARIOUS

TITLE:

TOP LEVEL ASSEMBLY

DRAWN BY:

CG

DWG #:

100

SHEET 1 OF 1

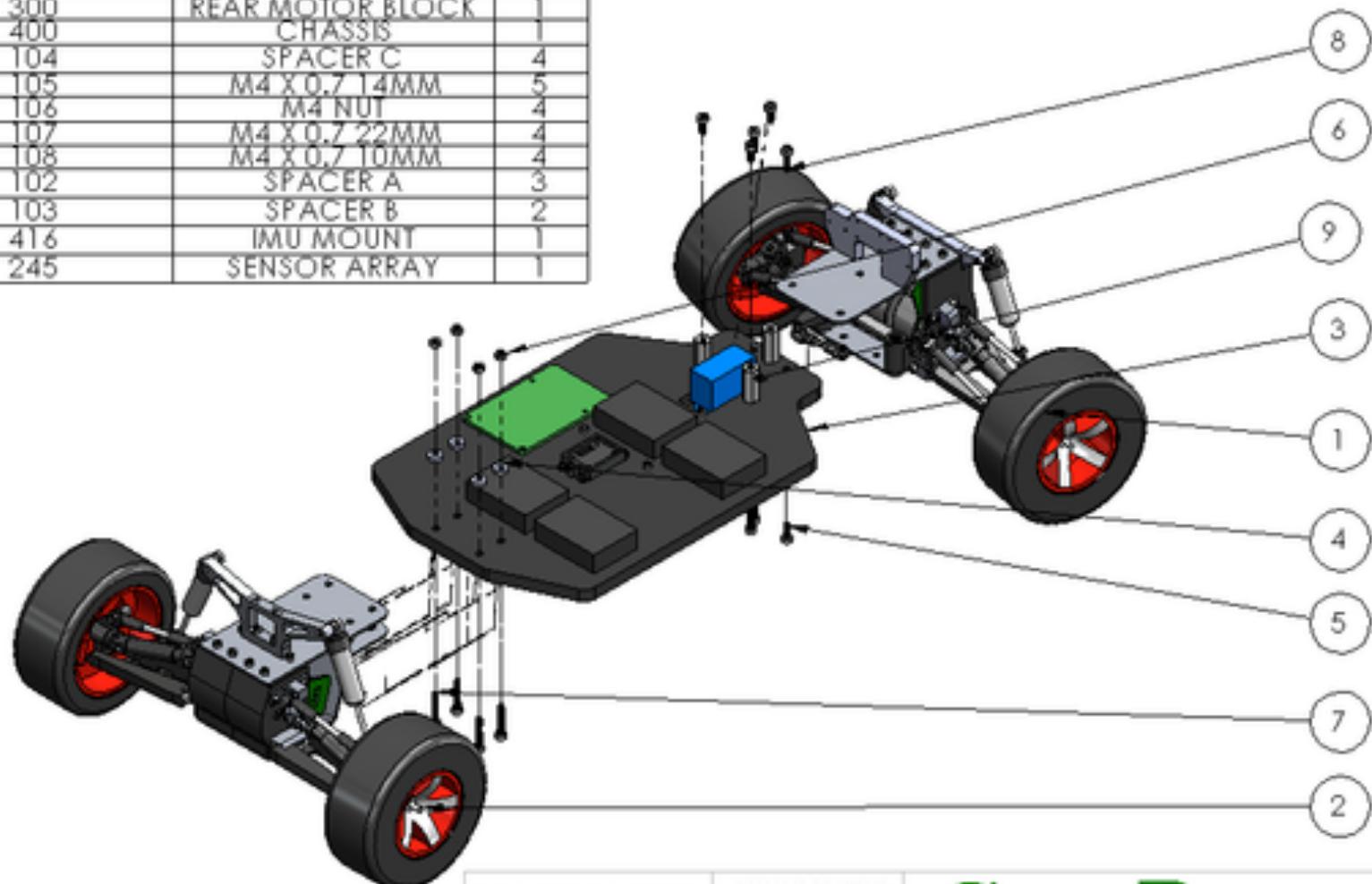
SCALE: 1:8

REV:

SIZE:

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200	FRONT MOTOR BLOCK	1
2	300	REAR MOTOR BLOCK	1
3	400	CHASSIS	1
4	104	SPACER C	4
5	105	M4 X 0.7 14MM	5
6	106	M4 NUT	4
7	107	M4 X 0.7 22MM	4
8	108	M4 X 0.7 10MM	4
9	102	SPACER A	3
10	103	SPACER B	2
11	416	IMU MOUNT	1
12	245	SENSOR ARRAY	1



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .5
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5-2009



MATERIAL:

VARIOUS

TITLE:

TOP LEVEL ASSEMBLY

DRAWN BY:

CG

DWG #:

101

SHEET 1 OF 1

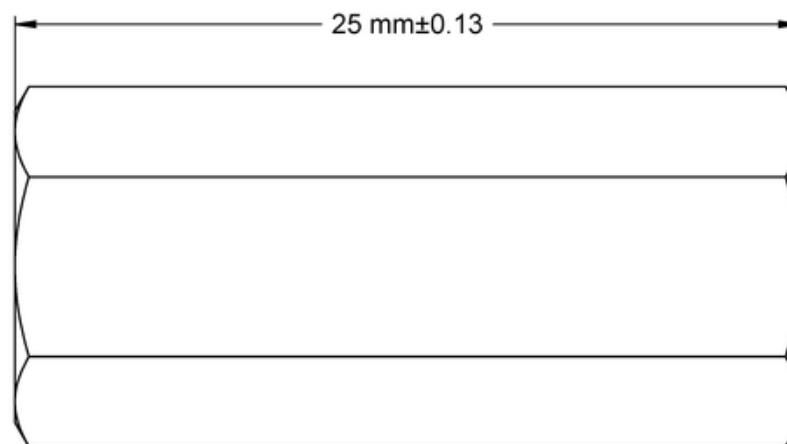
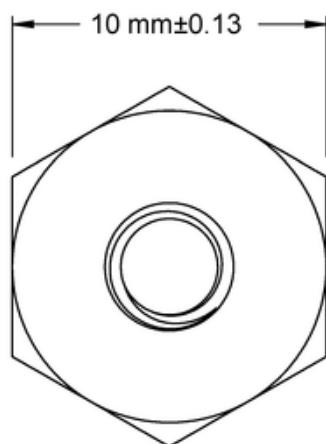
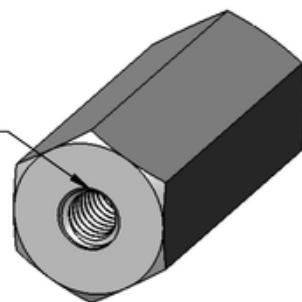
SCALE 1:1

REV:

SIZE:

A

CAL POLY
SAN LUIS OBISPO



McMASTER-CARR CAD

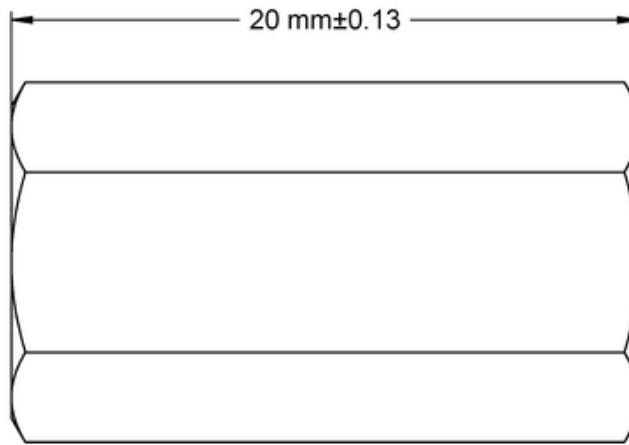
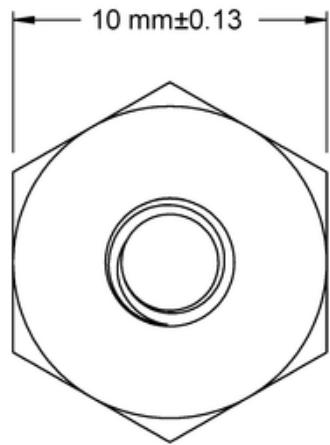
<http://www.mcmaster.com>
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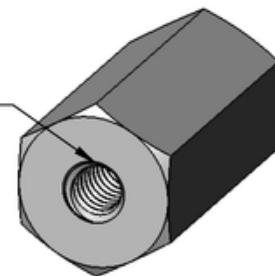
PART
NUMBER

95947A746

Female Threaded
Hex Standoff



M4 x 0.7 mm Thread



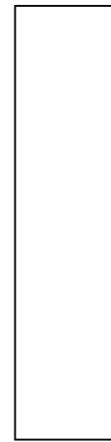
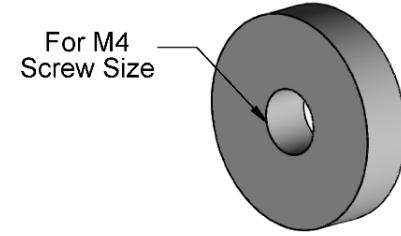
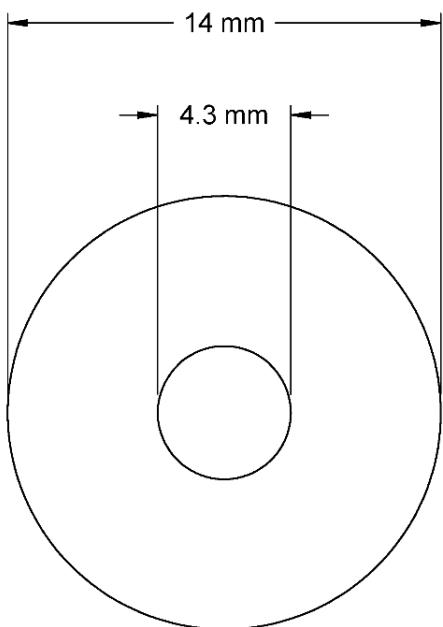
McMASTER-CARR CAD

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PART
NUMBER

95947A744

Female Threaded
Hex Standoff



Washer may vary from
2.5 mm to 3.4 mm in thickness.

McMASTER-CARR CAD

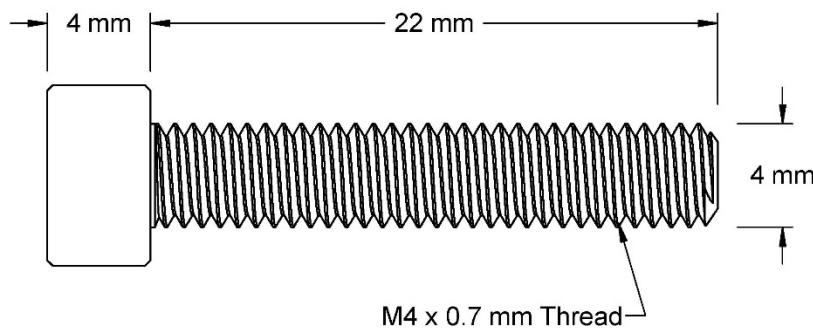
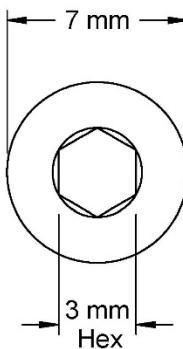
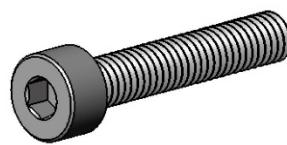
<http://www.mcmaster.com>

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PART
NUMBER **104**

Metric Oversized
Washer



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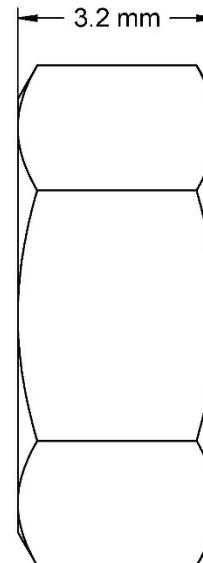
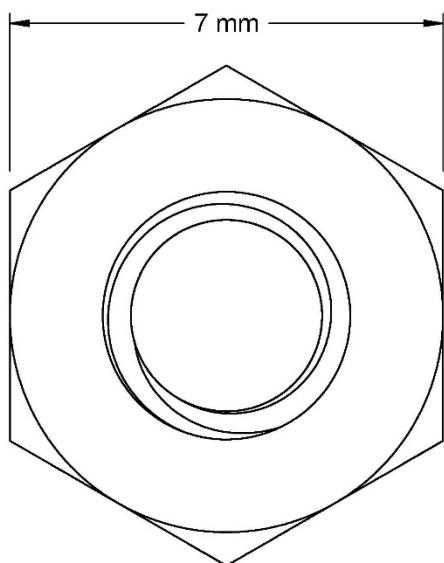
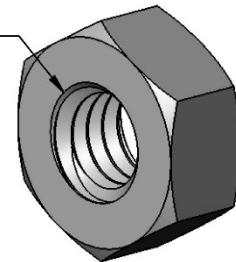
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PART
NUMBER **105**

Metric Alloy Steel
Socket Head Cap Screw

M4 x 0.7 mm Thread



McMASTER-CARR CAD

<http://www.mcmaster.com>

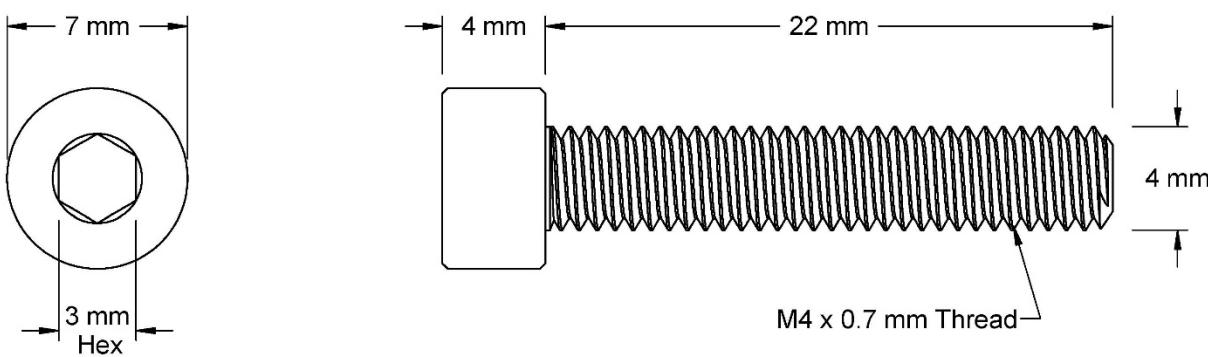
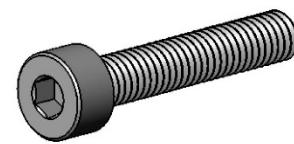
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PART
NUMBER

106

Metric
Hex Nut



McMASTER-CARR CAD

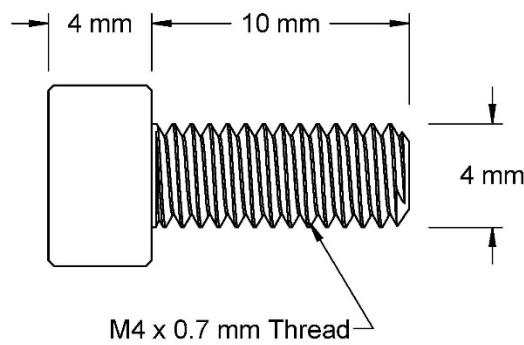
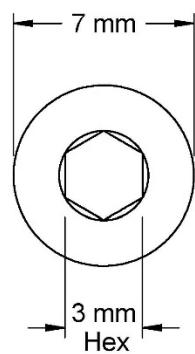
<http://www.mcmaster.com>

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PART
NUMBER **107**

Metric Alloy Steel
Socket Head Cap Screw



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Information in this drawing is provided for reference only.

PART
NUMBER **108**

Metric Alloy Steel
Socket Head Cap Screw

The diagram shows an exploded view of the F MOTOR BLOCK ASSEMBLY. Components are labeled with callouts numbered 1 through 13. Callout 1 points to the front wheel assembly. Callout 2 points to the rear wheel assembly. Callout 3 points to the front motor assembly. Callout 4 points to the rear motor assembly. Callout 5 points to the steering post dowel. Callout 6 points to the right steering post. Callout 7 points to the left steering post. Callout 8 points to the steering linkage. Callout 9 points to the front chassis mount. Callout 10 points to the rear chassis mount. Callout 11 points to the top plate. Callout 12 points to the shoulder bolt. Callout 13 points to the turnbuckle.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	230	FL MOTOR ASSEMBLY	1
2	220	FR MOTOR ASSEMBLY	1
3	205	STEERING POST DOWEL	2
4	202	F SUSP. MOUNT	1
5	207	RIGHT STEERING POST	1
6	206	LEFT STEERING POST	1
7	211	STEERING LINKAGE	1
8	203	FB CHASSIS MOUNT	1
9	212	S. STEER TURNBUCKLE	1
10	204	FT CHASSIS MOUNT	1
11	208	M3 X 0.5 6MM	8
12	210	M4 X 0.7 SHOULDER	2
13	209	M3 X 0.5 12 MM	8

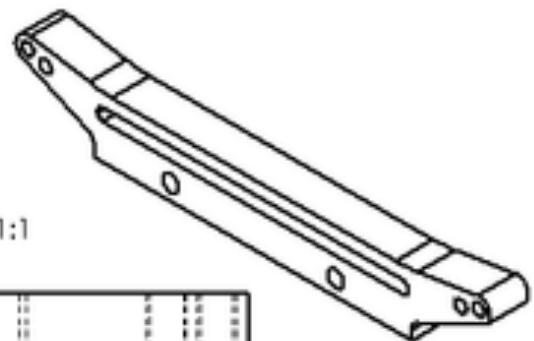
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ±
ONE PLACED DECIMAL ±.1
ANGLES ±1°

INTERPRET DRAWING PER ASME Y14.5 2009

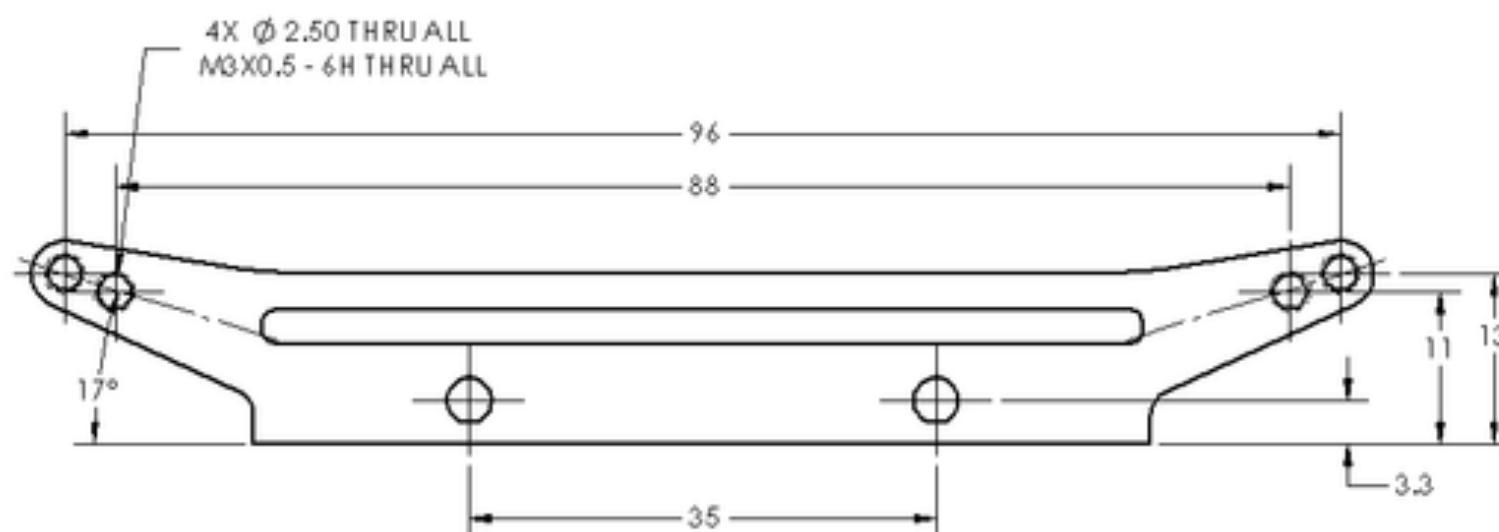
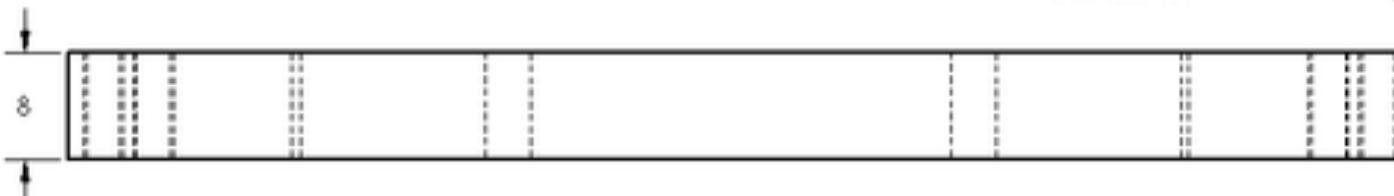
CAL POLY
SAN LUIS OBISPO

MATERIAL: VARIOUS TITLE: F MOTOR BLOCK ASSEMBLY EXPLODED

DRAWN BY: CG DWG #: 201 SHEET 1 OF 1 SCALE: 1:4 REV: SIZE: A



SCALE: 1:1



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN MM

TOLERANCES:

NO DECIMAL ± .5

ONE PLACE DECIMAL ± .1

ANGLES ± 1°

INTERPRET DRAWING
PER ASME Y14.5 2009



MATERIAL: AL-6061

TITLE: FRONT SUSPENSION MOUNT

DRAWN BY:

CG

DWG #:

202

SHEET 1 OF 1

SCALE: 1:2

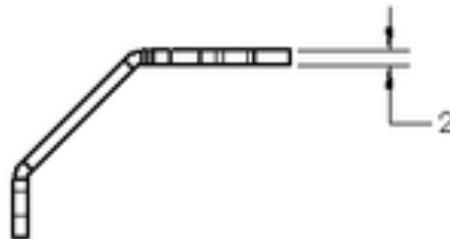
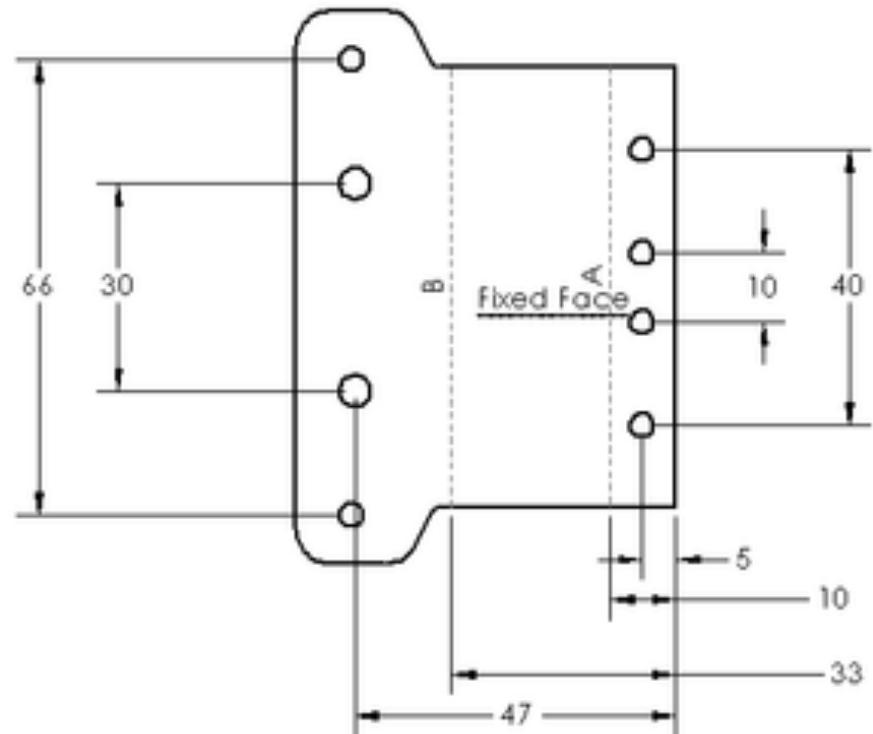
REV

SIZE

A

CAL POLY
SAN LUIS OBISPO

Tag	Direction	Angle	Inner Radius
A	DOWN	45°	2
B	DOWN	45°	2



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN IN
TOLERANCES:
ONE DECIMAL ± .5
TWO PLACE DECIMAL ± .05
ANGLES ± 1°

INTERPRET DRAWING
PER ASME Y14.5M-2009



MATERIAL: AL-3003

DRAWN BY:

CG

TITLE:

FRONT BOTTOM CHASSIS MOUNT

203

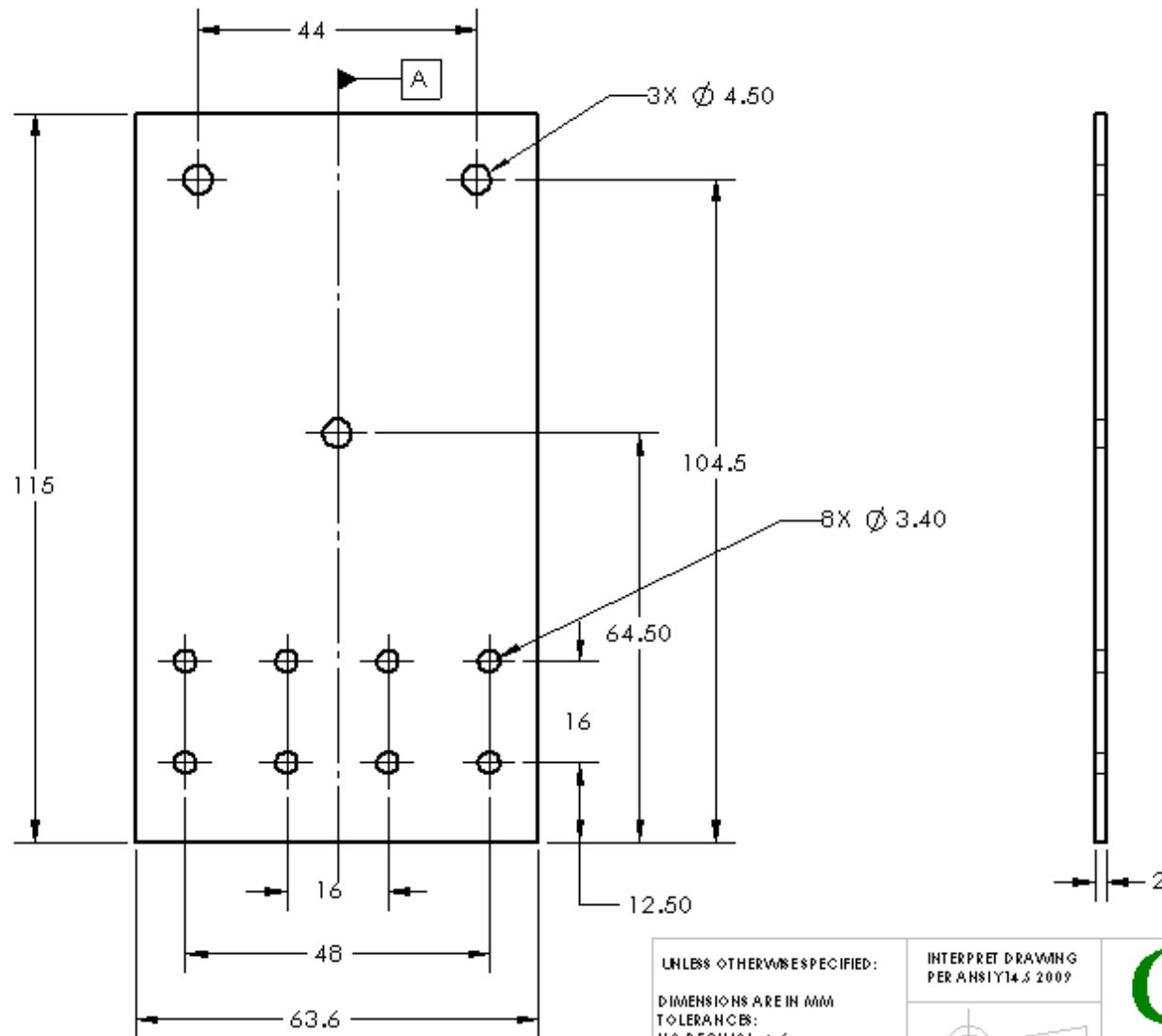
SHEET 1 OF 1

SCALE 1:1

REV

SIZE A

CAL POLY
SAN LUIS OBISPO



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACED DECIMAL ± .1
ANGLE ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE:

CAL POLY
SAN LUIS OBISPO

FRONT TOP CHASSIS MOUNT

DRAWN BY:

CG

DWG #:

204

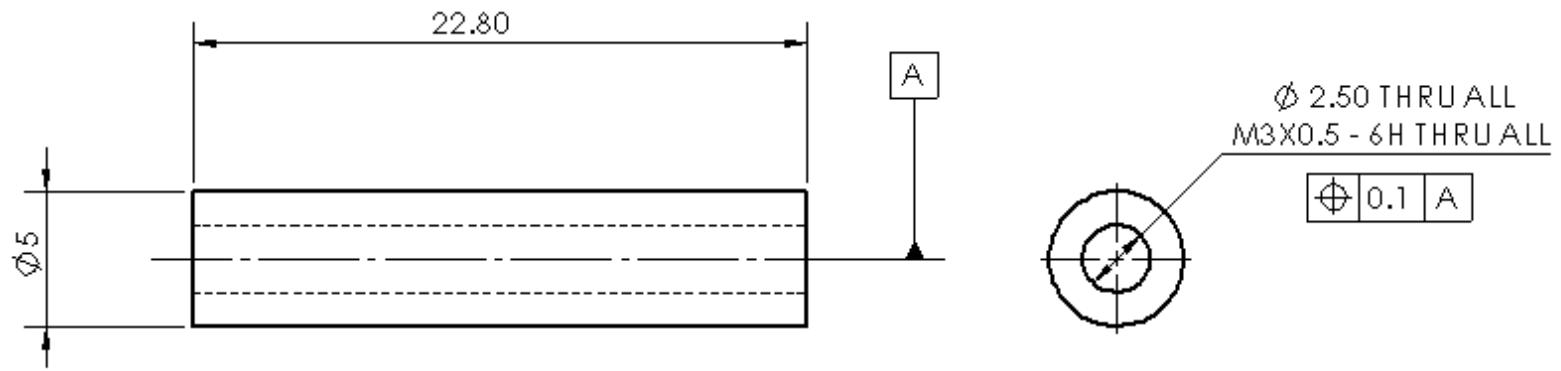
SHEET 1 OF 1

SCALE: 1:1

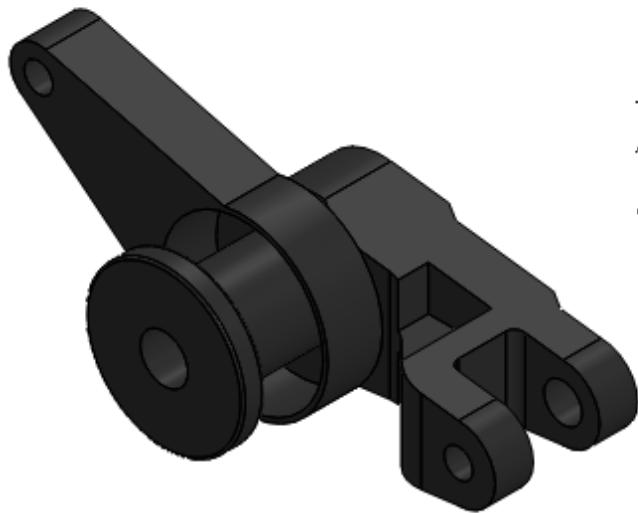
REV

SIZE

A



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: NO DECIMAL $\pm .5$ ONE PLACE DECIMAL $\pm .1$ ANGLES $\pm 1^\circ$	INTERPRET DRAWING PER ANSI Y14.5 2009		CAL POLY SAN LUIS OBISPO			
MATERIAL: AL-6061	TITLE: STEERING POST DOWEL					
DRAWN BY: CG	DWG #: 205	SHEET 1 OF 1	SCALE: 4:1	REV: A	SIZE:	



TRAXXAS SLASH
ASSEMBLY
PART
MODEL # 6845X

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACED DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: MISC.

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

206

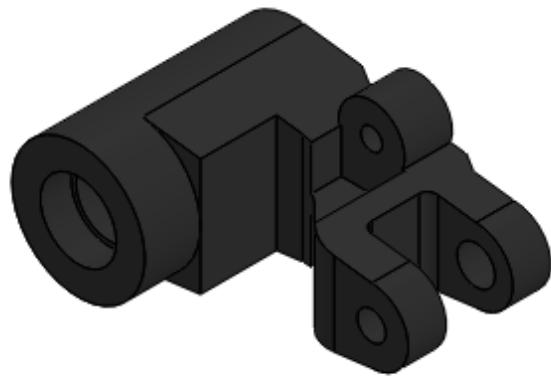
SHEET 1 OF 1

SCALE: 2:1

REV

SIZE

A



TRAXXAS SLASH
ASSEMBLY PART
MODEL # 6845X

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACED DECIMAL ± .1
ANGLES: ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



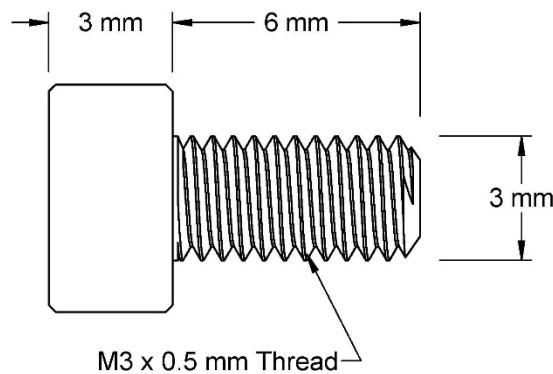
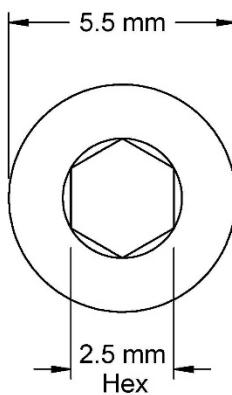
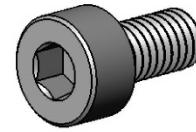
MATERIAL: misc

TITLE: STEERING BELLCRANK RIGHT

DRAWN BY: CG

DWG #: 207 SHEET 1 OF 1 SCALE: 2:1 REV A SIZE A

CAL POLY
SAN LUIS OBISPO



McMASTER-CARR CAD

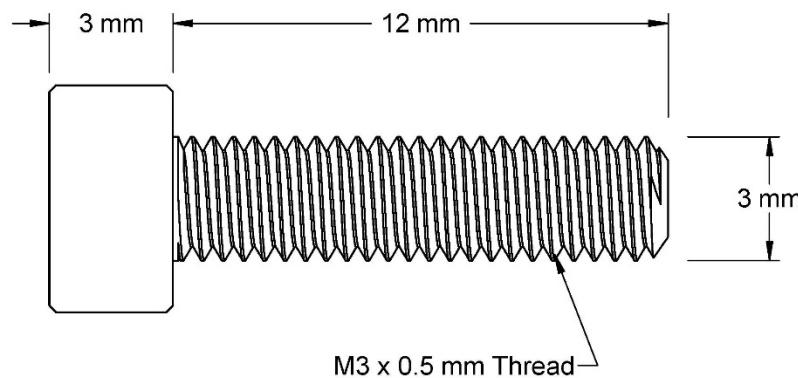
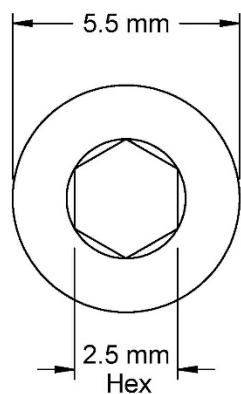
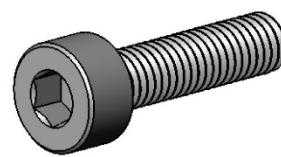
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PART
NUMBER **208**

Metric Alloy Steel
Socket Head Cap Screw



McMASTER-CARR CAD

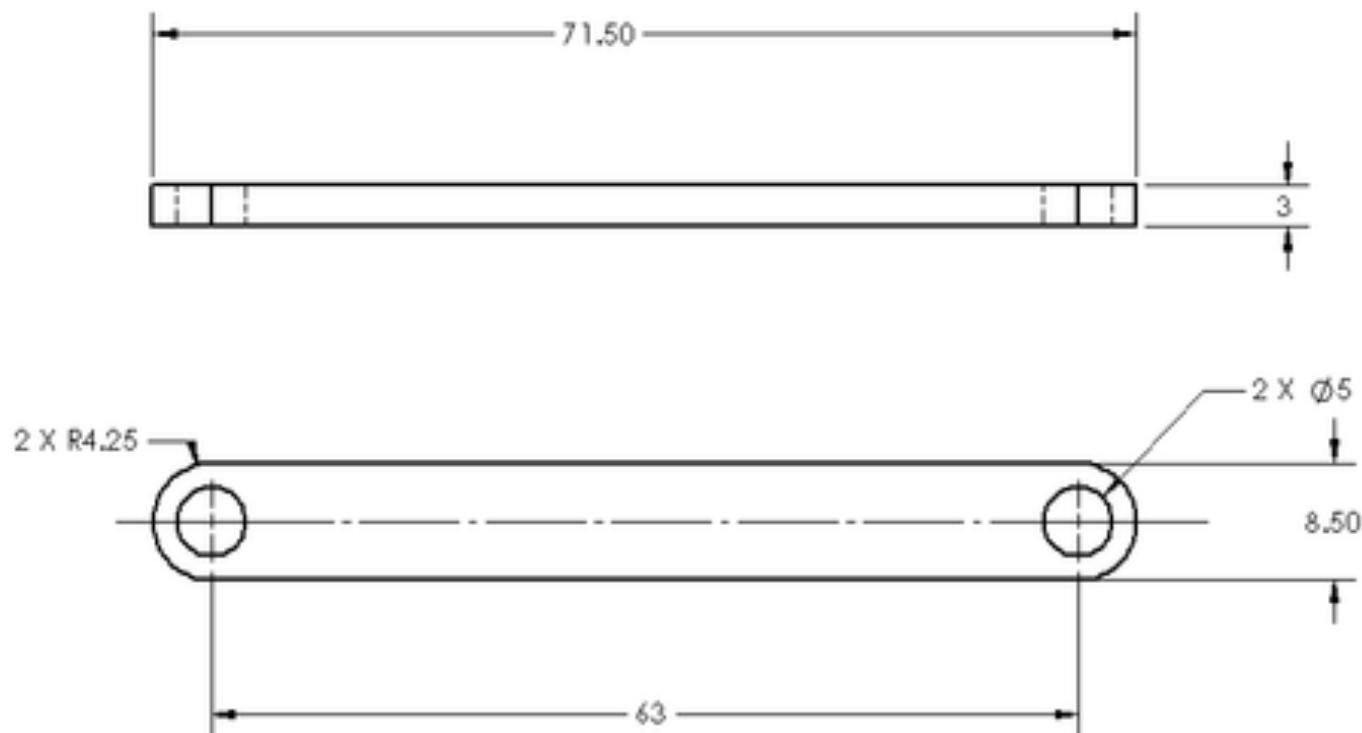
<http://www.mcmaster.com>

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Information in this drawing is provided for reference only.

PART
NUMBER **209**

Metric Alloy Steel
Socket Head Cap Screw



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES $\pm 3^\circ$

INTERPRET DRAWING
PER ASME Y14.5M 2009



MATERIAL: PLA

TITLE: STEERING LINKAGE

DRAWN BY:

CG

DWG #:

211

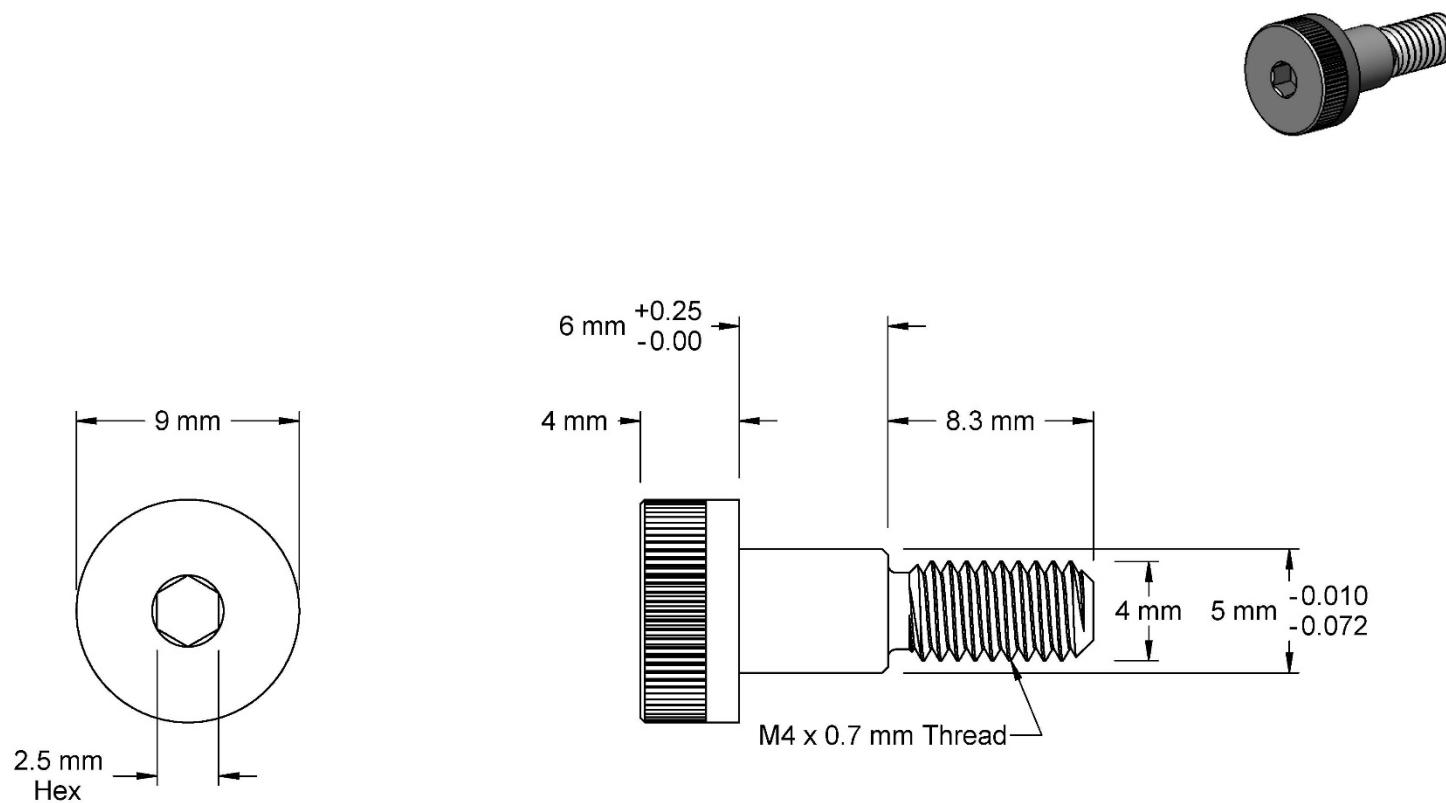
SHEET 1 OF 1

SCALE: 2:1

REV: A

SIZE
A

CAL POLY
SAN LUIS OBISPO



McMASTER-CARR CAD

<http://www.mcmaster.com>

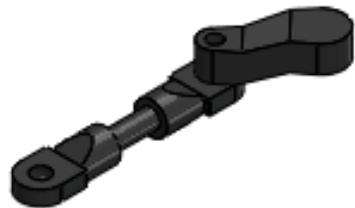
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Information in this drawing is provided for reference only.

PART
NUMBER **212**

Shoulder
Screw

TRAXXAS STEERING
TURNBUCKLE 4X4 SLASH



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMALS
ONE PLACE DECIMAL ± .
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5M 2009

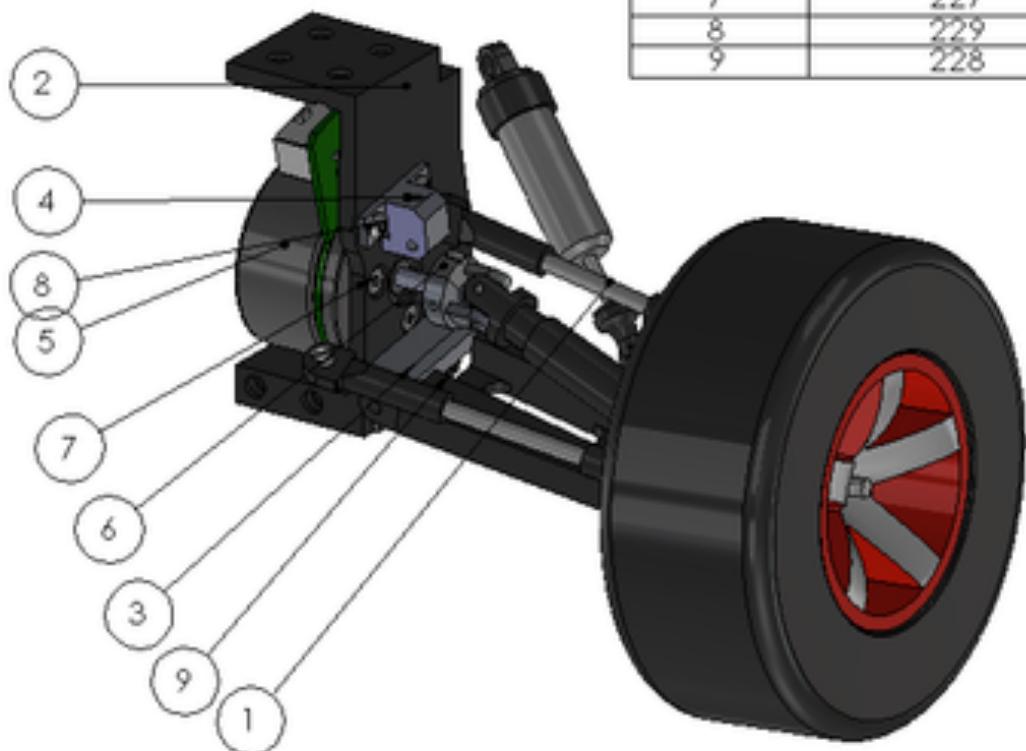


CAL POLY
SAN LUIS OBISPO

MATERIAL: MISC TITLE: SMALL STEERING TURNBUCKLE

DRAWN BY: CG DWG #: 213 SHEET 1 OF 1 SCALE: 1:1 REV: A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	221	TRAXXAS ASSEM RIGHT	1
2	222	FR MOTOR HOUSING	1
3	224	FRONT A-ARM MOUNT	1
4	223	F TURNBUCKLE MOUNT	1
5	226	MAXON MOTOR	1
6	225	SHAFT COUPLER	1
7	227	M3 X 0.5 4MM FLAT	3
8	229	M3 X 0.5 5MM ROUNDED	2
9	228	M3 X 0.5 MM SOCKET	2



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .5
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5-2009



MATERIAL: VARIOUS

DRAWN BY:

CG

TITLE: FR MOTOR BLOCK ASSEMBLY

DWG #: 220

SHEET 1 OF 1

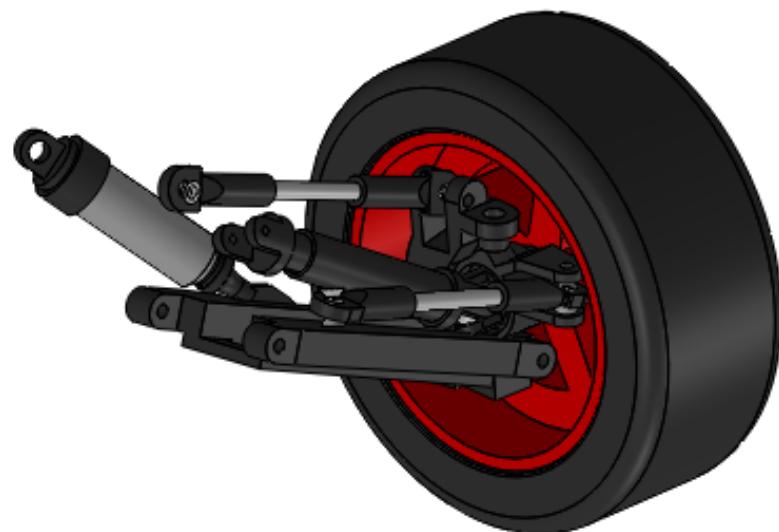
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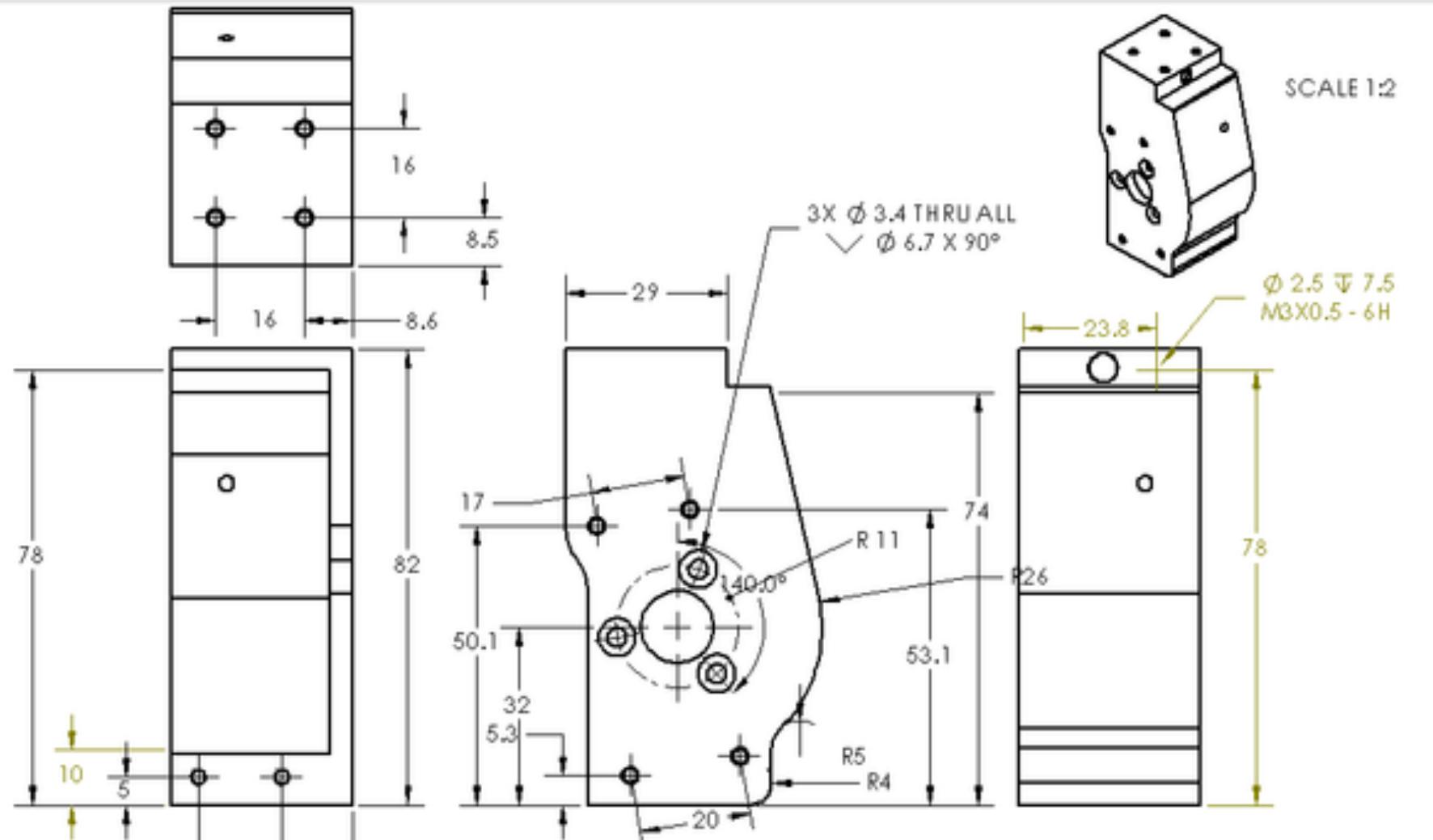
A

CAL POLY
SAN LUIS OBISPO

TRAXXAS SUSPENSION AND
DRIVETRAIN ASSEMBLY:



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: NO DECIMALS ONE PLACE DECIMAL ± .1 ANGLES ± 1°	INTERPRET DRAWING PER ANSI Y14.5 2009		CAL POLY SAN LUIS OBISPO		
MATERIAL: MISC	TITLE: TRAXXAS ASSEMBLY FRONT RIGHT				
DRAWN BY: CG	DWG #: 221	SHEET 1 OF 1	SCALE: 2:3	REV	SIZE A



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES $\pm 1^\circ$

INTERPRET DRAWING
PER ANSI Y14.5-2009



MATERIAL: AL-6061

TITLE: FR MOTOR HOUSING

DRAWN BY:

CG

DWG #:

222A

SHEET 1 OF 1

REV:

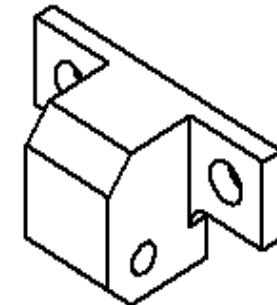
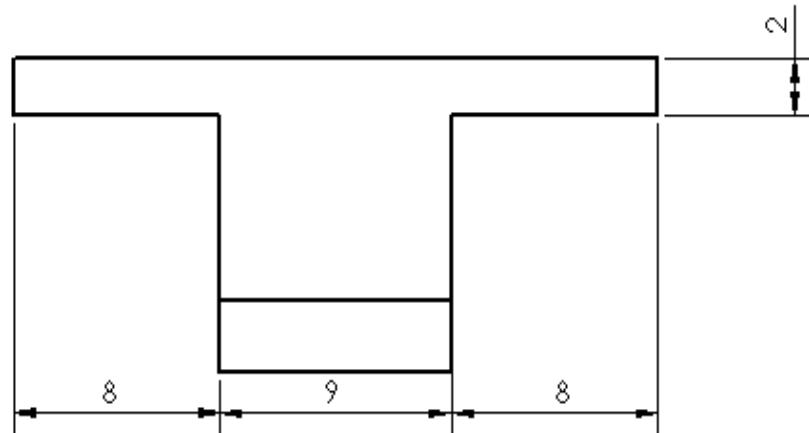
1

SIZE

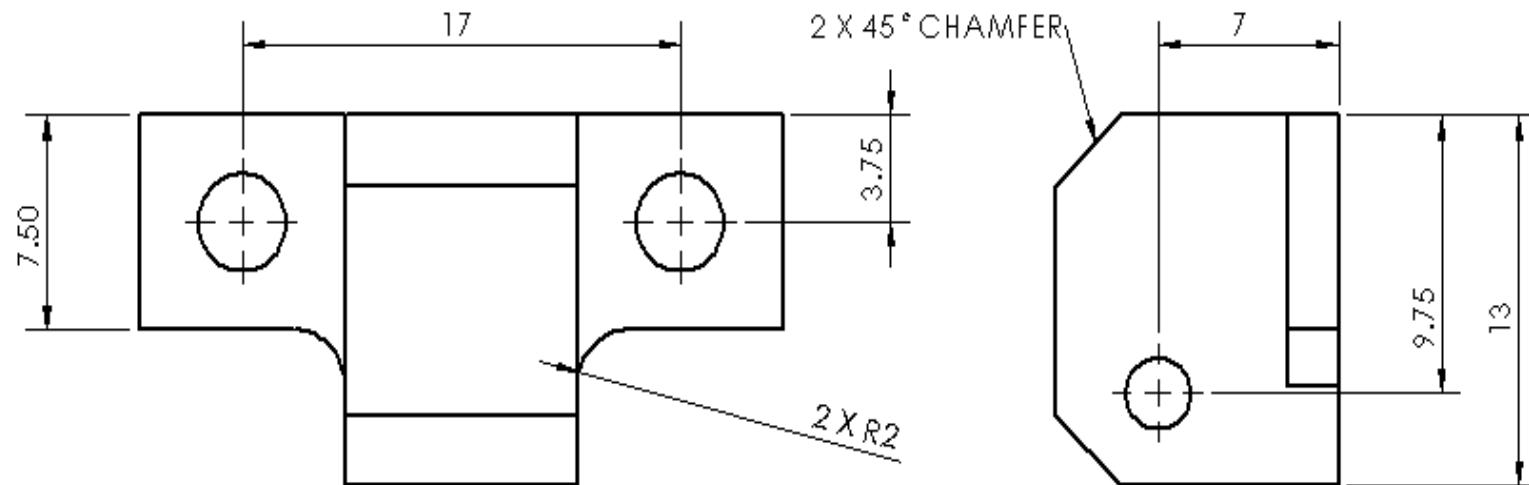
A

CAL POLY

SAN LUIS OBISPO



SCALE: 2:1



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACED DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: FRONT TURNBUCKLE MOUNT

DRAWN BY: CG

DWG #: 223

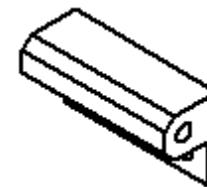
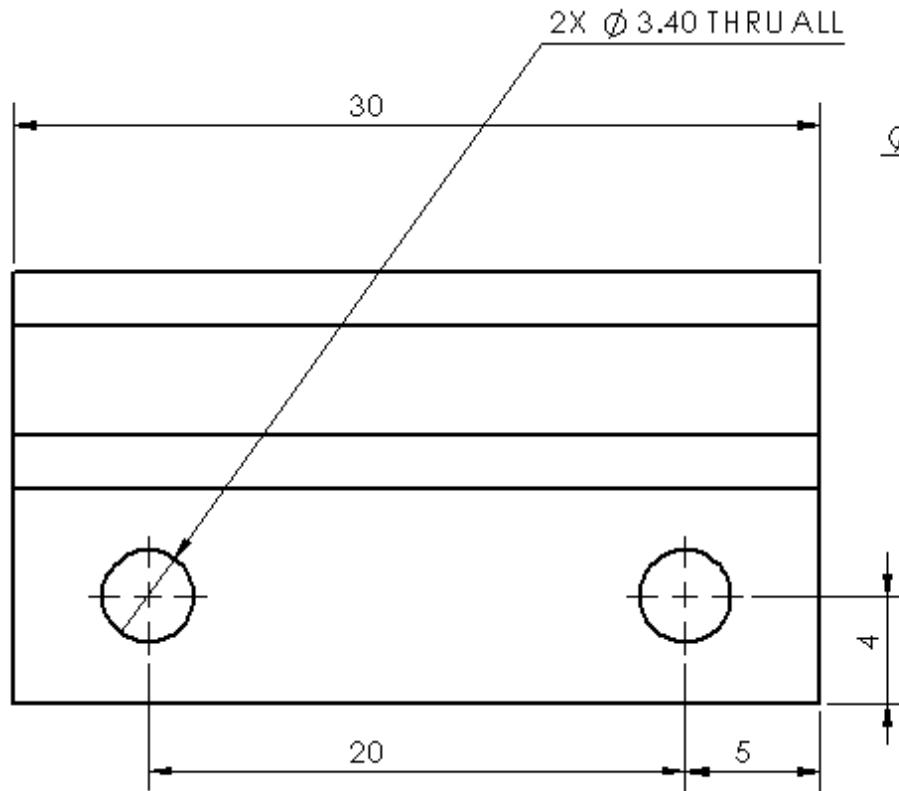
CAL POLY
SAN LUIS OBISPO

REV

A

SHEET 1 OF 1

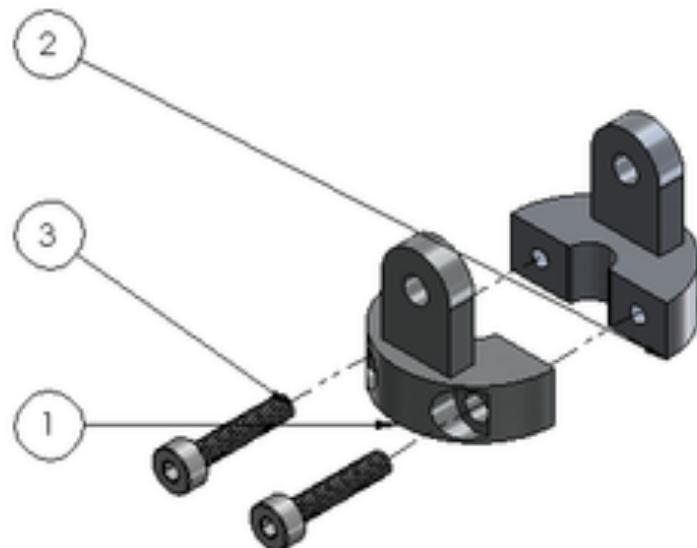
SCALE: 4:1



SCALE: 1:1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: NO DECIMAL ± ONE PLACE DECIMAL ±.1 ANGLES ±1°		INTERPRET DRAWING PER ASME Y14.5 2009		CAL POLY SAN LUIS OBISPO			
MATERIAL: AL-6061		TITLE:	FRONT A-ARM MOUNT		REV:	SIZE:	
DRAWN BY: CG		DWG #:	224	SHEET 1 OF 1	SCALE: 4:1	A	

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	225A	SHAFT COUPLER SIDE A	1
2	225B	SHAFT COUPLER SIDE B	1
3	231	M2.5 X 0.4 12MM SOCKET	2



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: VARIOUS

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

225

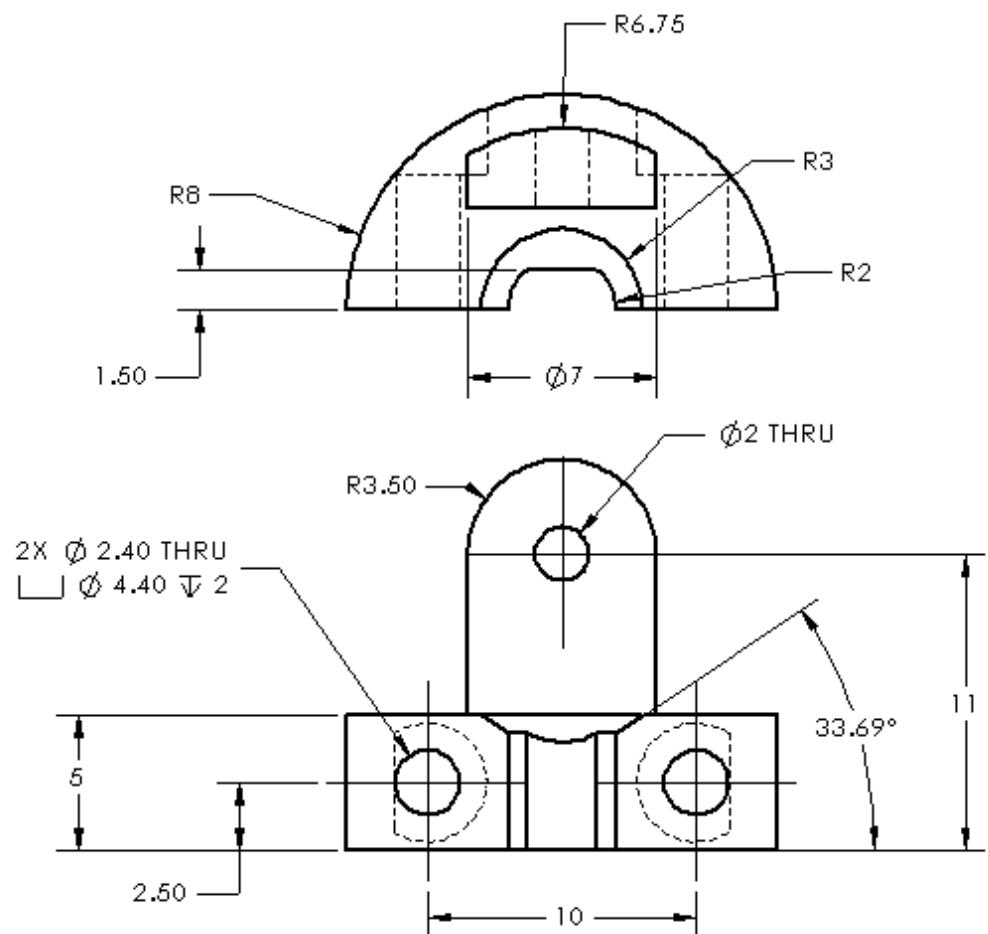
SHEET 1 OF 1

SCALE 2:1

REV:

SIZE:

A



SCALE: 1:1

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ±
ONE PLACE DECIMAL ±.1
ANGLES ±1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



CAL POLY
SAN LUIS OBISPO

MATERIAL: AL-6061

TITLE: SHAFT COUPLER SIDE A

DRAWN BY:

CG

DWG #:

225A

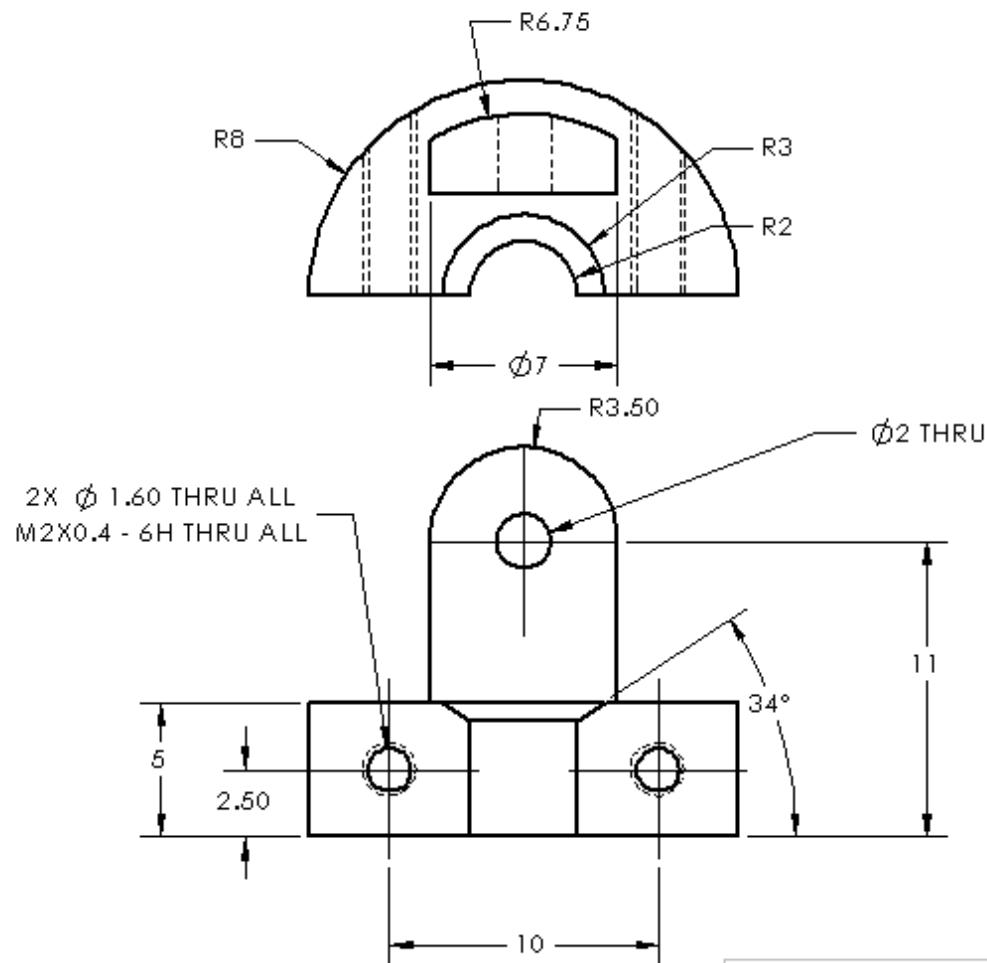
SHEET 1 OF 1

SCALE: 4:1

REV

SIZE

A



SCALE: 1:1

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ±
ONE PLACE DECIMAL ±.1
ANGLES ±1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: SHAFT COUPLER SIDE B

DRAWN BY:

CG

DWG #:

225B

SHEET 1 OF 1

SCALE: 4:1

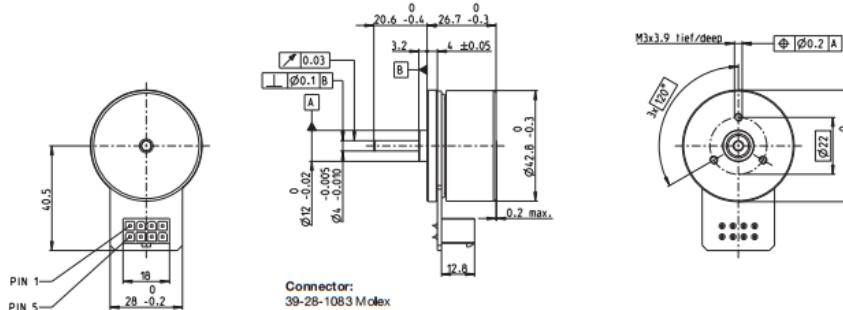
REV SIZE

A

CAL POLY
SAN LUIS OBISPO

EC 45 flat Ø42.8 mm, brushless, 70 Watt

maxon flat motor



M 1:2

Stock program
Standard program
Special program (on request)

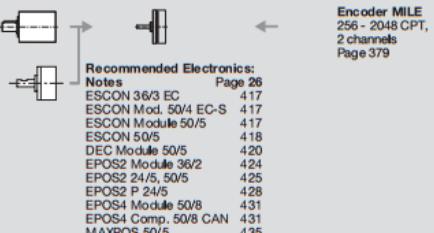
Part Numbers

Motor Data (provisional)	with Hall sensors	397172	402685	402686	402687		
Values at nominal voltage	V	24	30	36	48		
1 Nominal voltage	V	24	30	36	48		
2 No load speed	rpm	6110	6230	6330	3440		
3 No load current	mA	234	194	166	48.1		
4 Nominal speed	rpm	4860	4990	5080	2540		
5 Nominal torque (max. continuous torque)	mNm	128	112	108	134		
6 Nominal current (max. continuous current)	A	3.21	2.36	1.93	0.936		
7 Stall torque	mNm	1460	1170	1100	915		
8 Stall current	A	39.5	25.8	20.7	6.97		
9 Max. efficiency	%	85	84	83	84		
Characteristics							
10 Terminal resistance phase to phase	Ω	0.608	1.16	1.74	6.89		
11 Terminal inductance phase to phase	mH	0.463	0.691	0.966	5.85		
12 Torque constant	mNm / A	36.9	45.1	53.3	131		
13 Speed constant	rpm / V	259	212	179	72.7		
14 Speed / torque gradient	rpm / mNm	4.26	5.44	5.85	3.82		
15 Mechanical time constant	ms	8.07	10.3	11.1	7.24		
16 Rotor inertia	gcm²	181	181	181	181		
Specifications							
Thermal data							
17 Thermal resistance housing-ambient	3.58 K/W						
18 Thermal resistance winding-housing	4.1 K/W						
19 Thermal time constant winding	29.6 s						
20 Thermal time constant motor	178 s						
21 Ambient temperature	-40 ... +100°C						
22 Max. winding temperature	+125°C						
Mechanical data (preloaded ball bearings)							
23 Max. speed	10 000 rpm						
24 Axial play at axial load < 4.0 N	0 mm						
24 Axial play at axial load > 4.0 N	0.14 mm						
25 Radial play	preload						
26 Max. radial load (dynamic)	3.8 N						
27 Max. force for press fits (static)	50 N						
27 (static, shaft supported)	1000 N						
28 Max. radial load, 5 mm from flange	21 N						
Other specifications							
29 Number of pole pairs	8						
30 Number of phases	3						
31 Weight of motor	141 g						
Values listed in the table are nominal.							
Connection							
Pin 1	Hall sensor 1*						
Pin 2	Hall sensor 2*						
Pin 3	V _{bus} 4.5 ... 18 VDC						
Pin 4	Motor winding 3						
Pin 5	Hall sensor 3*						
Pin 6	GND						
Pin 7	Motor winding 1						
Pin 8	Motor winding 2						
*Internal pull-up (7 ... 13 kΩ) on pin 3							
Wiring diagram for Hall sensors see p. 37							
Cable							
Connection cable Universal, L = 500 mm	339380						
Connection cable to EPOS, L = 500 mm	354045						
Option							
With Cable and Connector							
(Ambient temperature -20 ... +100°C)							

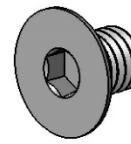
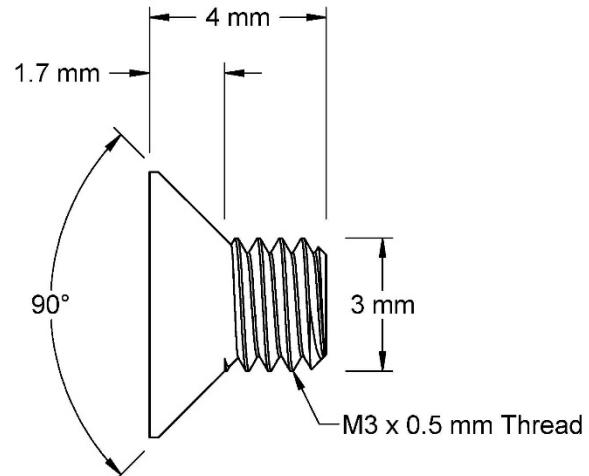
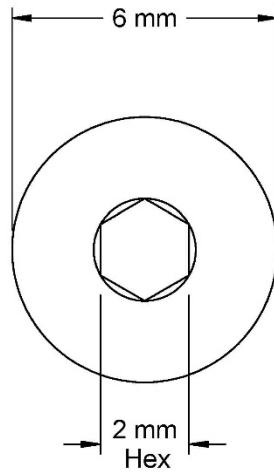
April 2016 edition / subject to change

maxon EC motor 301

Encoder MILE
256 - 2048 CPT,
2 channels
Page 379



Notes	Page 26
ESCON 3/6 EC	417
ESCON Mod. 50/4 EC-S	417
ESCON Module 50/5	417
ESCON 50/5	418
DEC Module 50/5	420
EPOS2 Module 36/2	424
EPOS2 24/5, 50/5	425
EPOS2 P 24/5	428
EPOS4 Module 50/8	431
EPOS4 Comp. 50/8 CAN	431
MAXPOS 50/5	435



McMASTER-CARR CAD

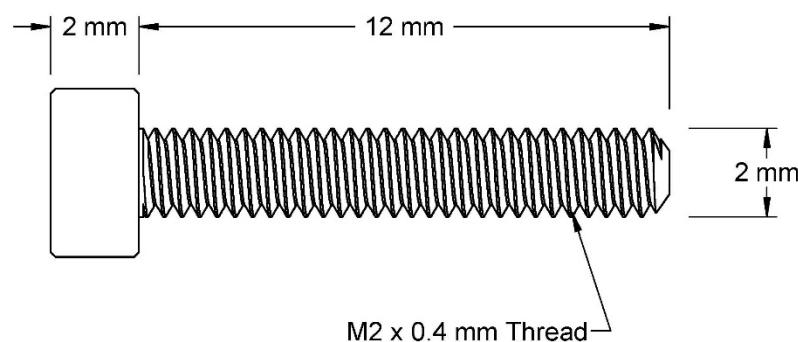
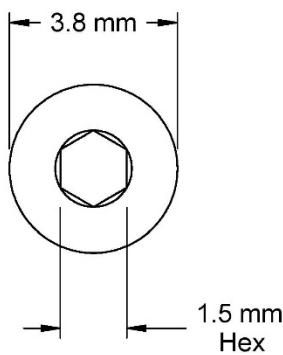
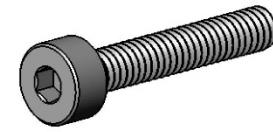
<http://www.mcmaster.com>

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Information in this drawing is provided for reference only.

PART
NUMBER **227**

Stainless Steel Flat-Head
Socket Cap Screw



McMASTER-CARR CAD

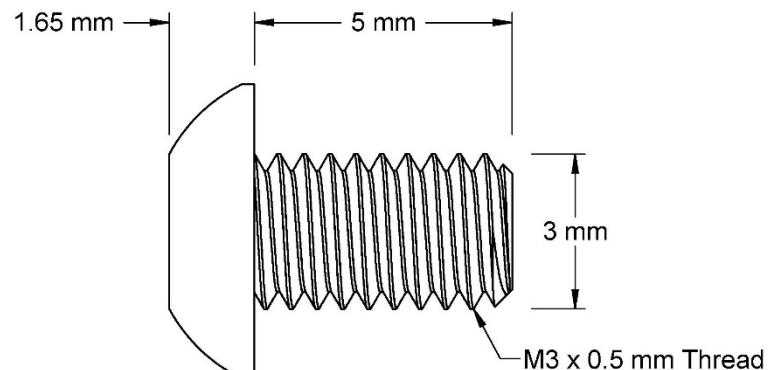
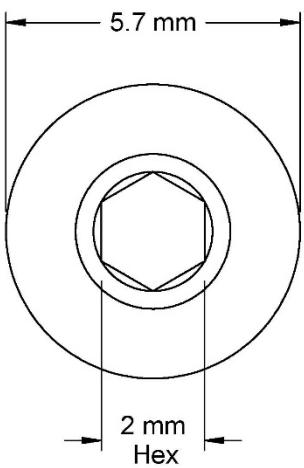
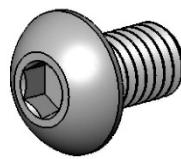
<http://www.mcmaster.com>

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Information in this drawing is provided for reference only.

PART
NUMBER **228**

Metric Alloy Steel
Socket Head Cap Screw



McMASTER-CARR CAD

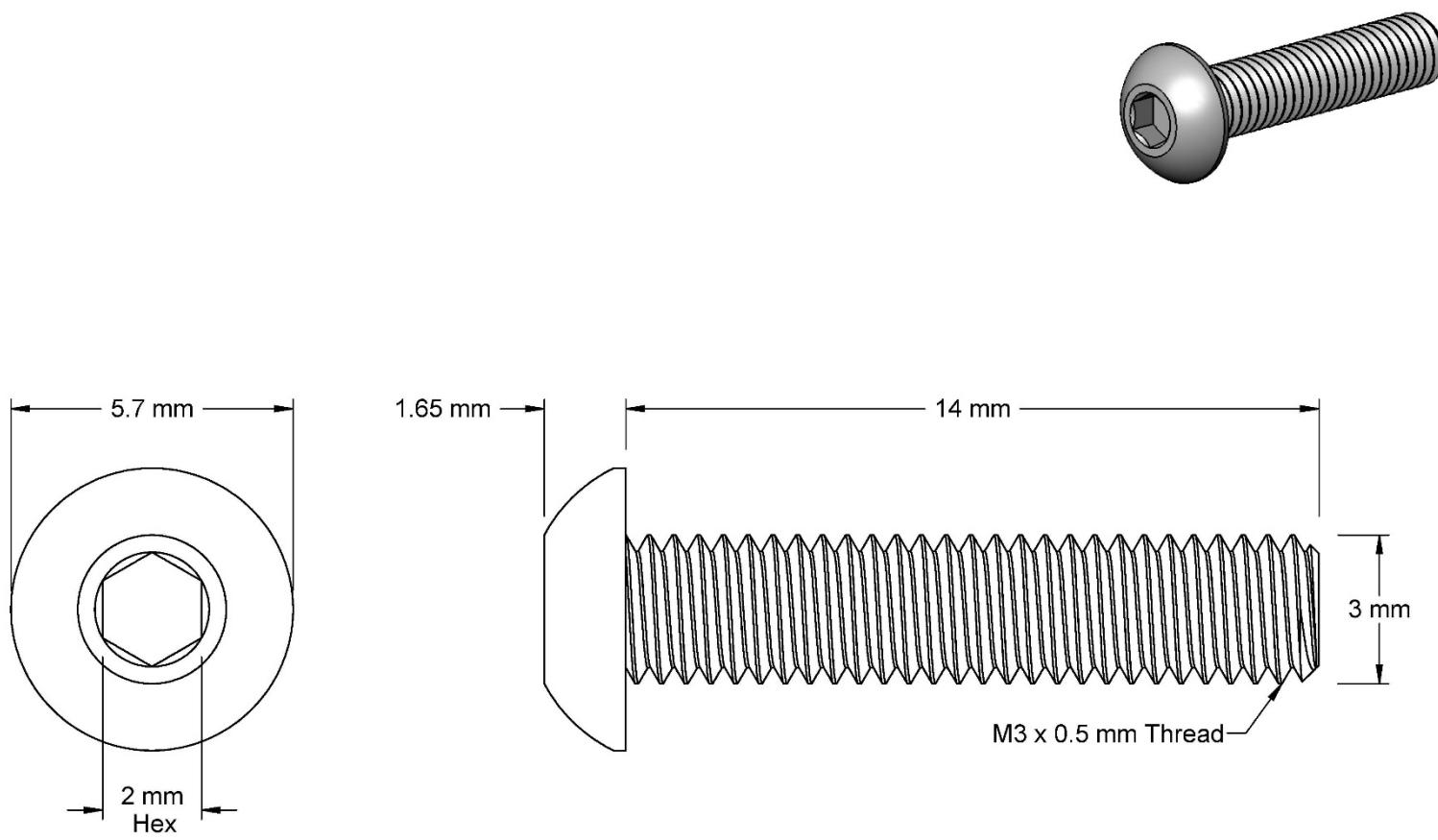
<http://www.mcmaster.com>

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Information in this drawing is provided for reference only.

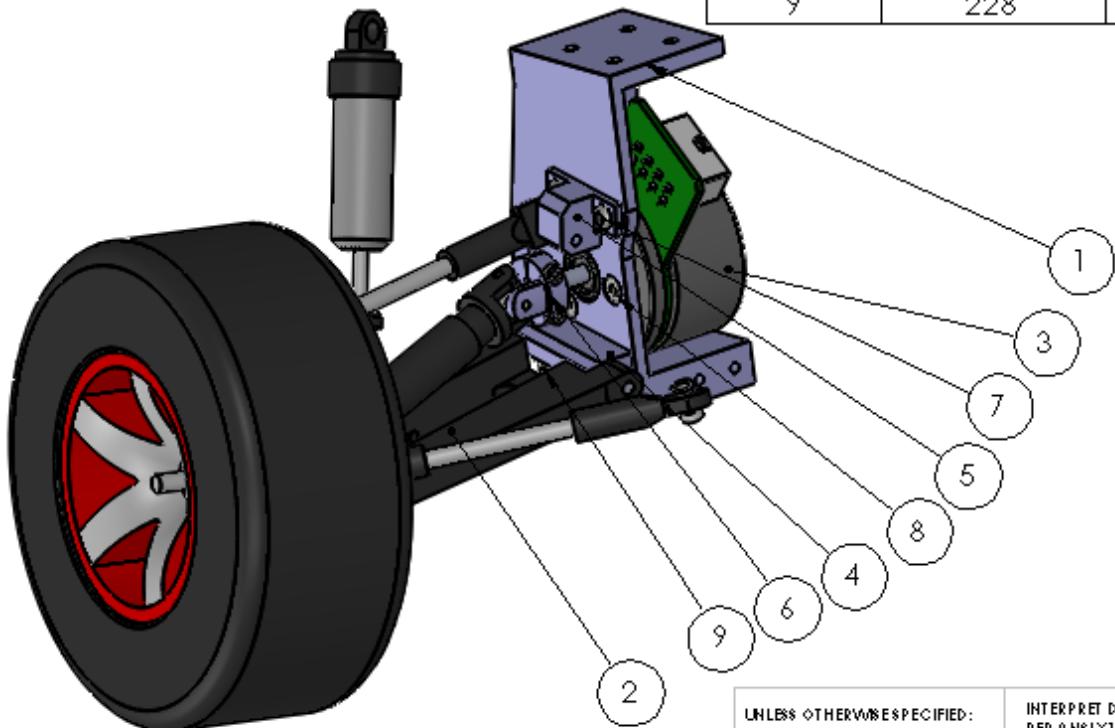
PART
NUMBER **229**

Alloy Steel Button-Head
Socket Cap Screw



McMASTER-CARR® CAD	PART NUMBER 230
http://www.mcmaster.com © 2014 McMaster-Carr Supply Company	Alloy Steel Button-Head Socket Cap Screw
Information in this drawing is provided for reference only.	

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	242	FL MOTOR HOUSING	1
2	241	FLTRAXXAS ASSEM	2
3	226	MAXON MOTOR	1
4	224	A-ARM MOUNT FRONT	1
5	223	TURNBUCKLE MOUNT FRONT	1
6	225	SHAFT COUPLER	1
7	229	M3 X 0.5 5MM ROUND	2
8	227	M3 X 0.5 4MM FLAT	3
9	228	M3 X 0.5 12MM SOCKET	2



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .5
ONE PLACED DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

240

SHEET 1 OF 1

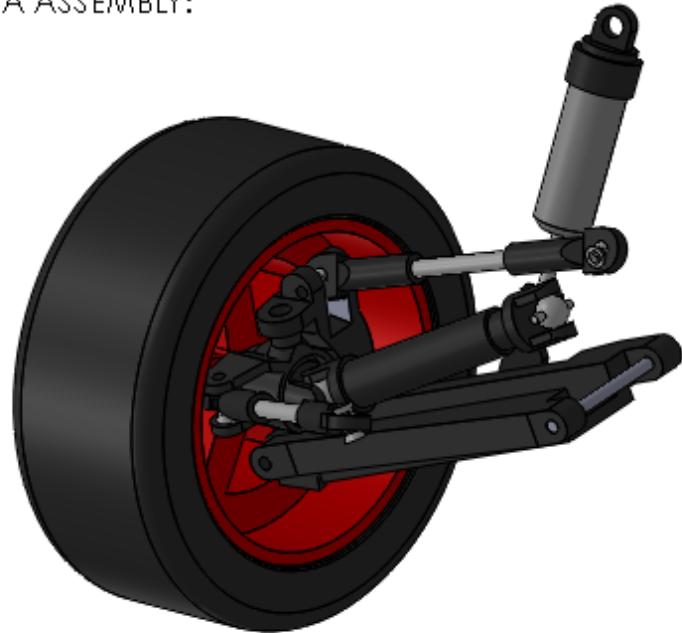
SCALE: 1:4

REV

SIZE

A

TRAXXAS DRIVETRAIN AND
SUSPENSION ASSEMBLY:



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES $\pm 1^\circ$

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: MISC

TITLE: FRONT LEFT TRAXXAS ASSEMBLY

DRAWN BY: CG

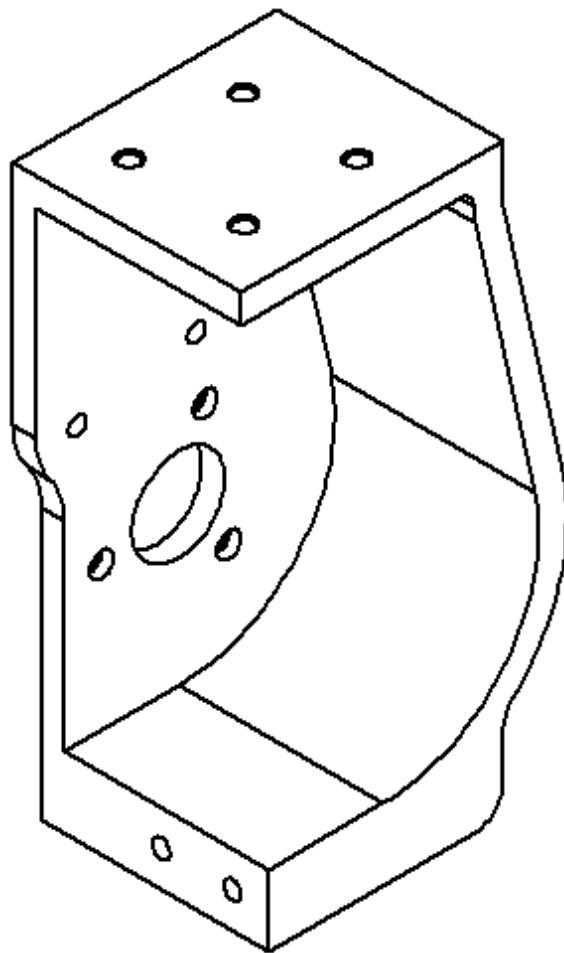
DWG #: 241

SHEET 1 OF 1

SCALE: 2:3

REV: SIZE
A

CAL POLY
SAN LUIS OBISPO



SEE PART 222A:
MIRRORED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: FL MOTOR HOUSING

DRAWN BY:

CG

DWG #:

242

SHEET 1 OF 1

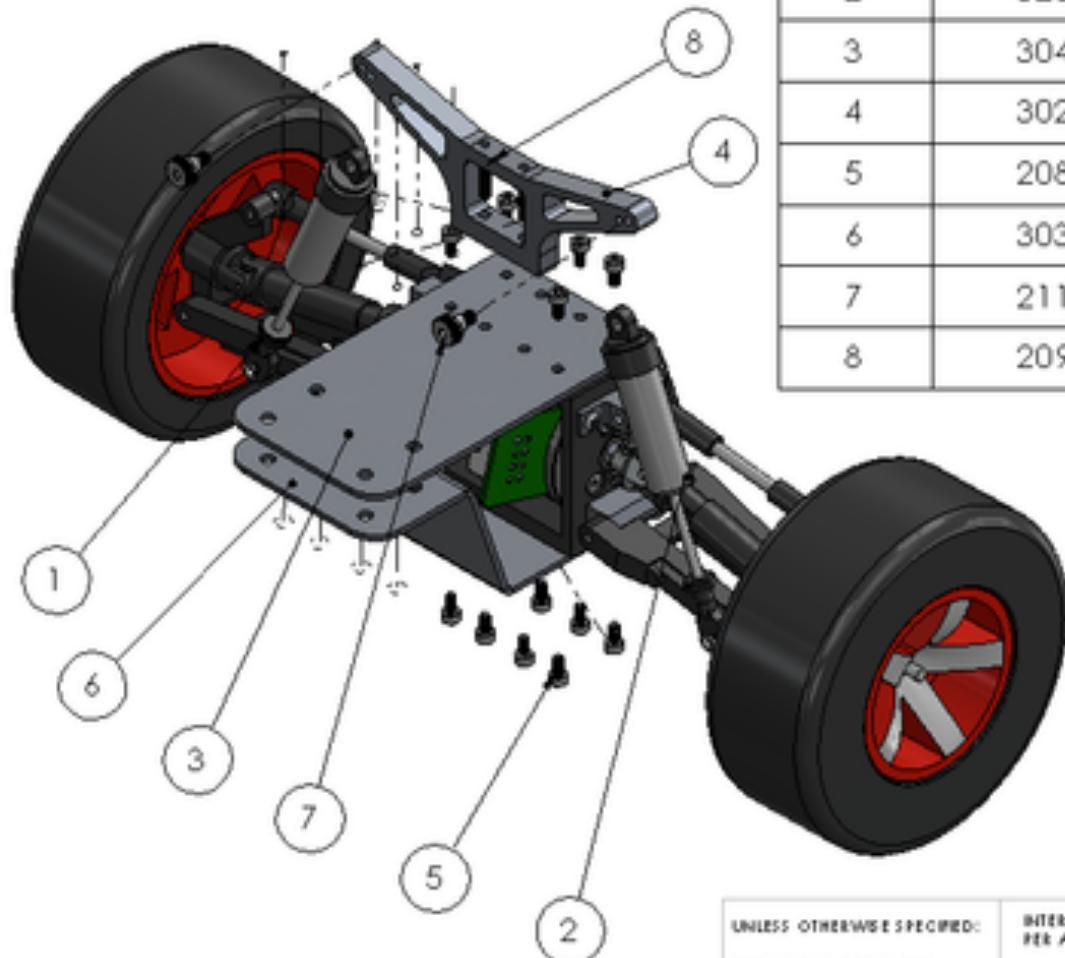
SCALE: 2:3

REV

SIZE

A

CAL POLY
SAN LUIS OBISPO



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	310	TRAXXAS ASSEM RR	1
2	320	TRAXXAS ASSEM RI	1
3	304	REAR TOP CHASSIS MOUNT	1
4	302	SUSPENSION MOUNT REAR	1
5	208	M3 X 0.5 6MM SOCKET	14
6	303	REAR BOTTOM CHASSIS MOUNT	1
7	211	M4 X 0.7 6MM SHOULDER	2
8	209	M3 X 0.5 12MM SOCKET	2

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: VARIOUS

DRAWN BY:

CG

TITLE: REAR MOTOR BLOCK ASSEM. EXPLODED

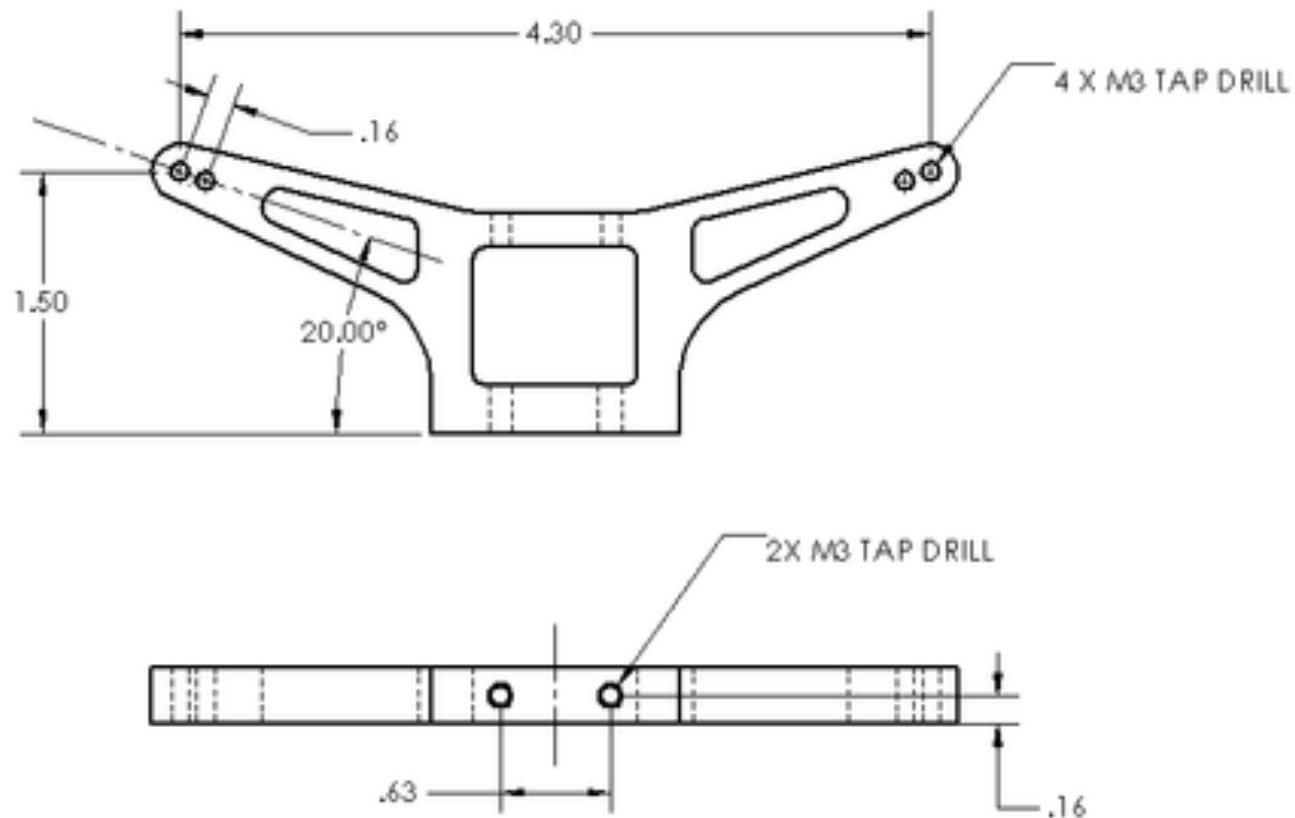
DWG #: 301

SHEET 1 OF 1

SCALE 1:2

REV A

CAL POLY
SAN LUIS OBISPO



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACE DECIMAL ± .
ANGLES ± 1°

INTERPRET DRAWING
PER ASME Y14.5 2009



CAL POLY
SAN LUIS OBISPO

MATERIAL: AL-6061

TITLE:

REAR HOLE DETAIL

DRAWN BY:

CG

DWG #:

302A

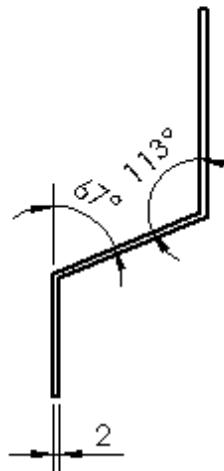
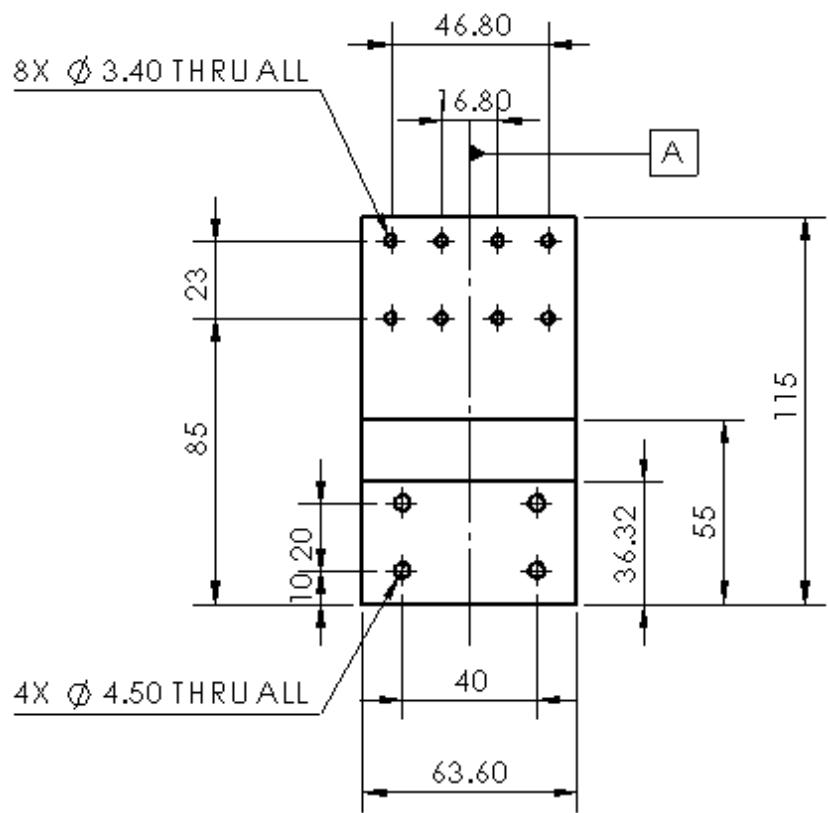
SHEET 1 OF 1

SCALE 1:1

REV:

SIZE:

A



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ±
ONE PLACE DECIMAL ±
ANGLES ±1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

DRAWN BY:

CG

TITLE: REAR BOTTOM CHASSIS MOUNT

DWG #: 303

SHEET 1 OF 1

SCALE: 1:2

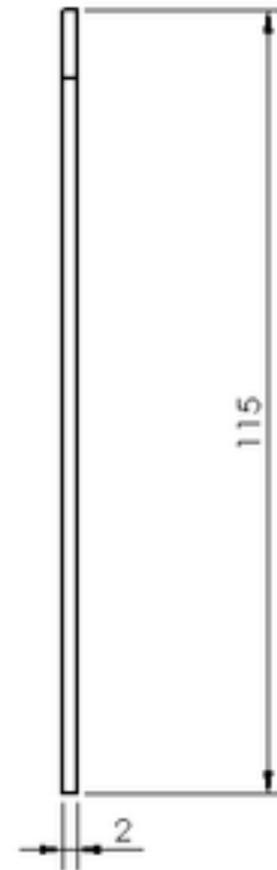
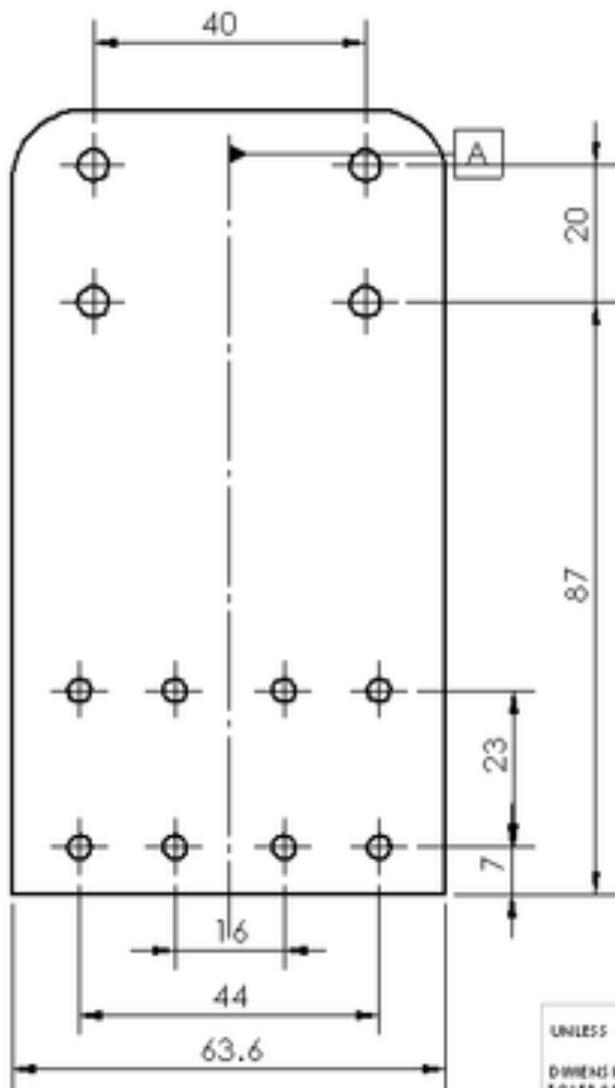
REV

SIZE

CAL POLY

SAN LUIS OBISPO

A



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .3
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ASME Y14.5M-2009



MATERIAL:

AL-6061

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

304

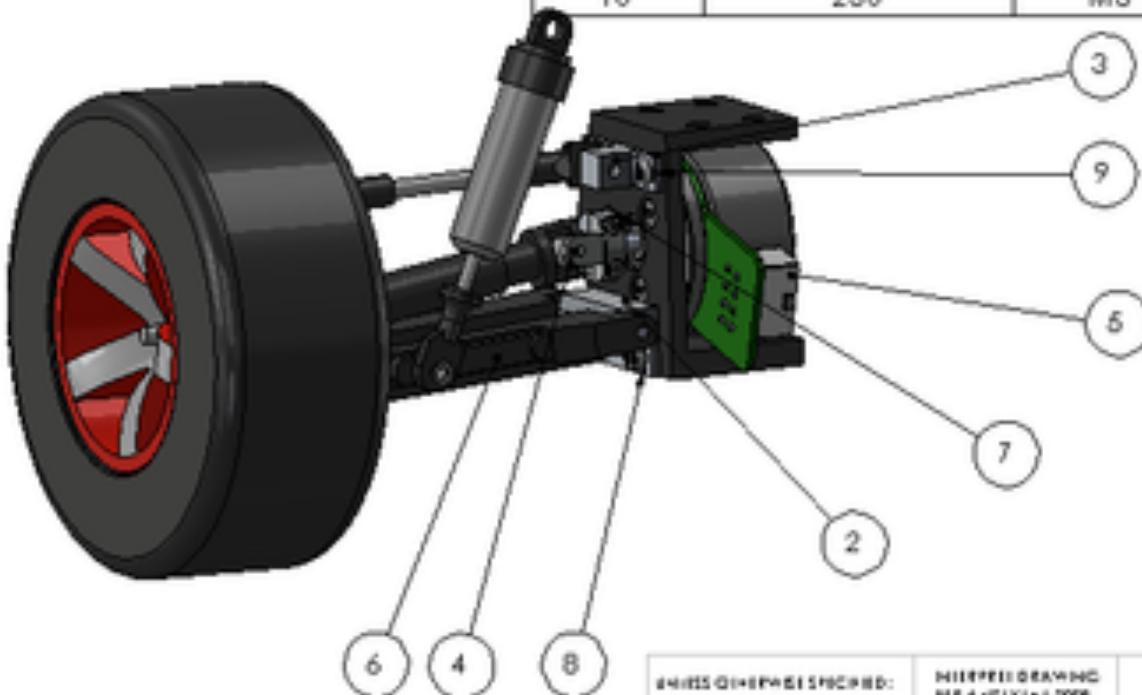
Sheet 1 of 1

SCALE 1:1

REV

SIZE
A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	311	REAR RIGHT MOTOR HOUSING	1
2	314	REAR A-ARM MOUNT	1
3	313	REAR TURNBUCKLE MOUNT	1
4	225	SHAFT COUPLER	1
5	226	MAXON MOTOR	1
6	312	RIGHT REAR TRAXXAS ASSEM	1
7	227	M3 X 0.5 4MM FLAT	3
8	228	M3 X 0.5 12 MM SOCKET	2
9	229	M3 X 0.5 5MM ROUND	2
10	230	M3 X 0.5 14MM ROUND	1



ENGLISH DIMENSIONS
INCHES
DIMENSIONS IN MM
DIMENSIONS:
NO DEGREES
ONE PLACE DECIMAL
ANGLES ±1°

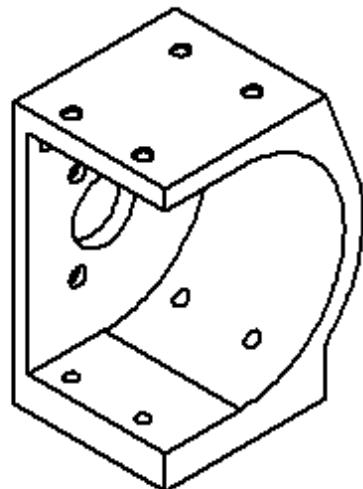
HIGHER DRAWING
PER ANSII Y14.5-2009

CAL POLY
SAN LUIS OBISPO

MATERIAL: VARIOUS TITLE: REAR RIGHT MOTOR BLOCK ASSEM

DRAWN BY: CG DWG #: 310 SHEET 1 OF 1 SCALE: 2:3 REV: SEE
A

SEE DRAWING 321 - MIRRORED PART



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES: $\pm 1^\circ$

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: REAR RIGHT MOTOR HOUSING

DRAWN BY:

CG

DWG #:

311

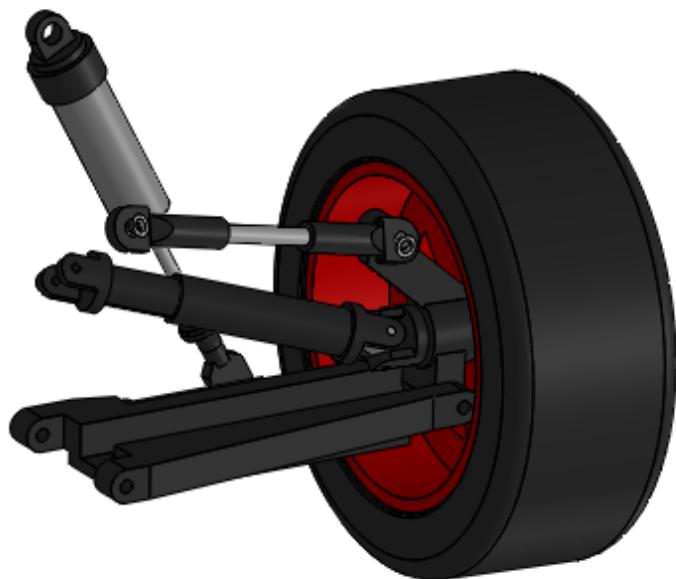
SHEET 1 OF 1

SCALE: 1:1

REV: **A**

CAL POLY
SAN LUIS OBISPO

TRAXXAS DRIVETRAIN
AND SUSPENSION
ASSEMBLY



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES $\pm 1^\circ$

INTERPRET DRAWING
PER ANSI Y14.5 2009



CAL POLY
SAN LUIS OBISPO

MATERIAL: MISC

TITLE: REAR RIGHT TRAXXAS ASSEMBLY

DRAWN BY: CG

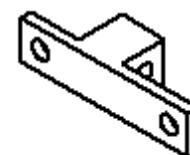
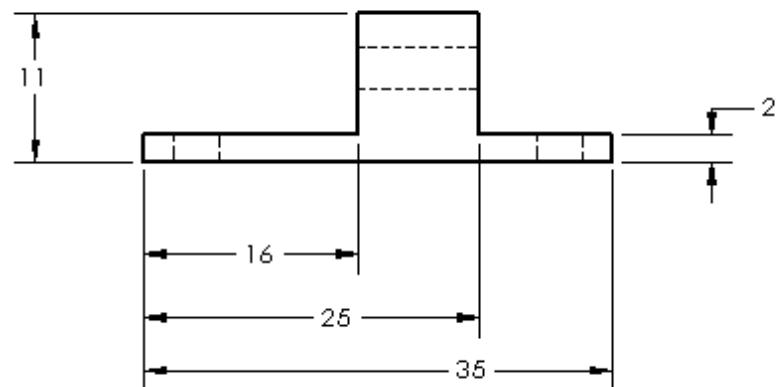
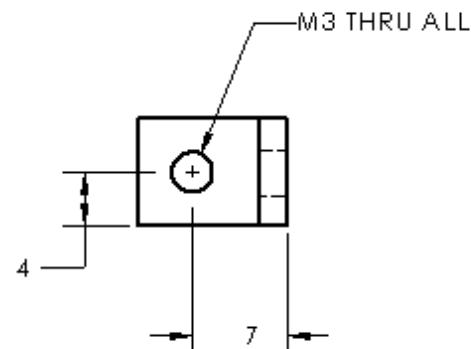
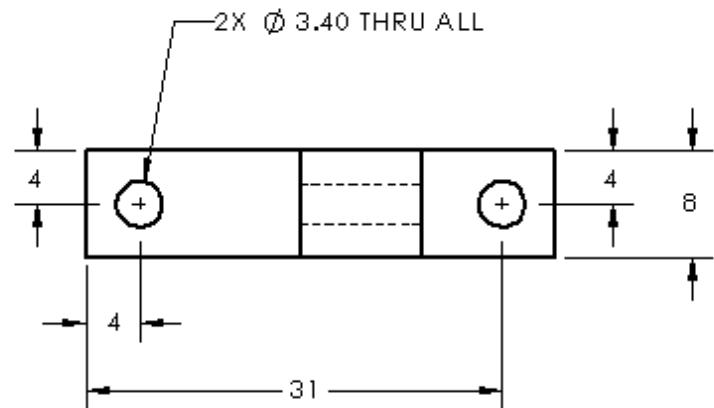
DWG #: 312

SHEET 1 OF 1

SCALE: 2:3

REV:

SIZE: A



SCALE: 1:1

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ±
ONE PLACE DECIMAL ±.1
ANGLES: ±1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: REAR TURNBUCKLE MOUNT

DRAWN BY:

CG

DWG #:

314

SHEET 1 OF 1

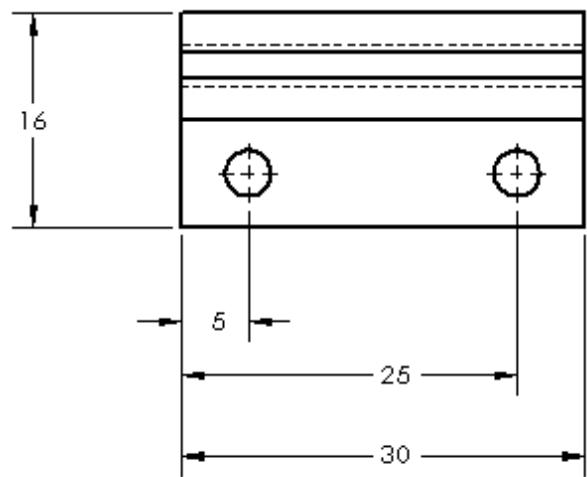
SCALE: 2:1

REV:

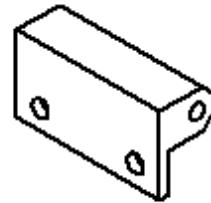
SIZE:

A

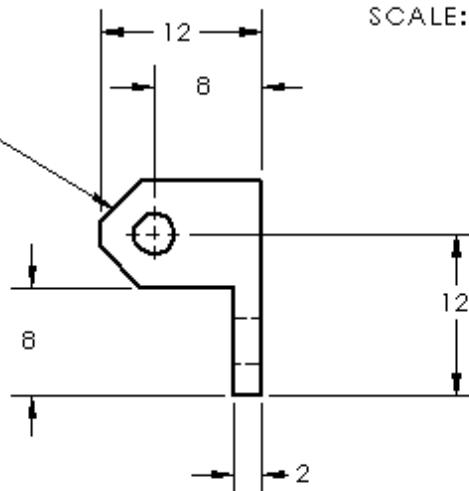
CAL POLY
SAN LUIS OBISPO



2 X 45°
CHAMFER



SCALE: 1:1



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .5
ONE PLACE DECIMAL ± .1
ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: A-ARM MOUNT REAR

DRAWN BY:

CG

DWG #:

315

SHEET 1 OF 1

SCALE: 2:1

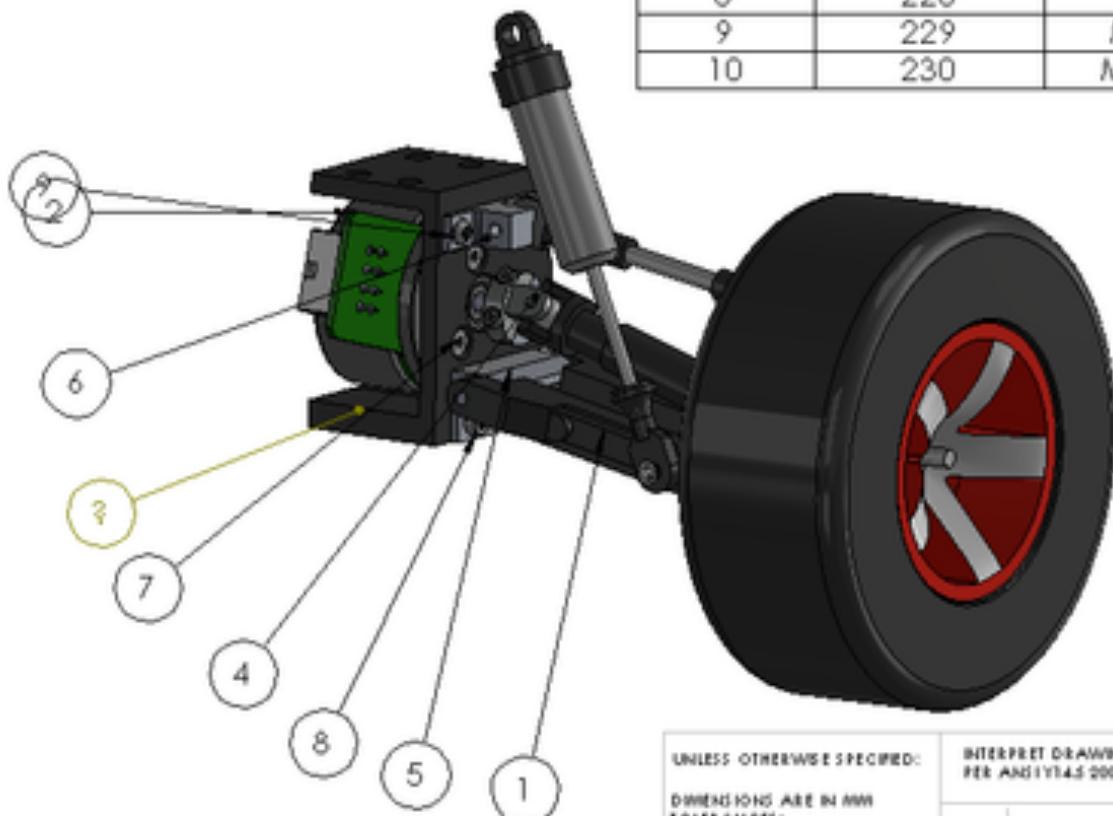
REV

SIZE

A

CAL POLY
SAN LUIS OBISPO

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	322	REAR LEFT TRAXXAS ASSEM	1
2	226	MAXON MOTOR	1
3	323	REAR LEFT MOTOR HOUSING	1
4	225	SHAFT COUPLER	1
5	314	REAR A-ARM MOUNT	1
6	313	REAR TURNBUCKLE MOUNT	1
7	227	M3 X 0.5 4MM FLAT	3
8	228	M3 X 0.5 12MM SOCKET	2
9	229	M3 X 0.5 5MM ROUNDED	2
10	230	M3 X 0.5 14MM ROUNDED	1



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN MM

TOLERANCES:

NO DECIMAL ± .5

ONE PLACE DECIMAL ± .1

ANGLES ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL:

VARIOUS

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

320

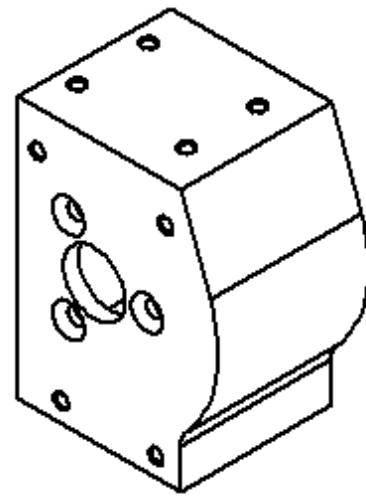
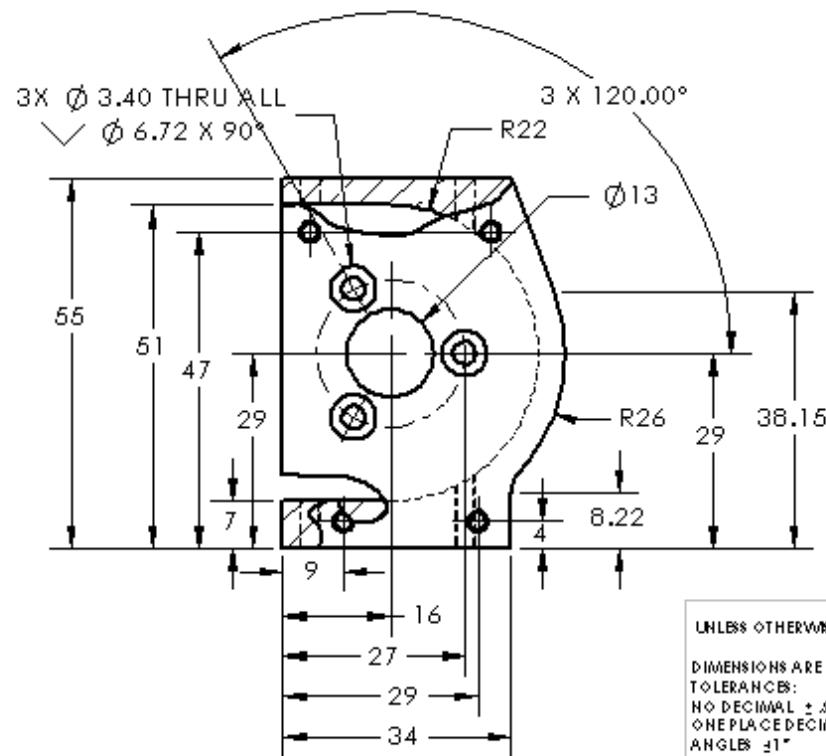
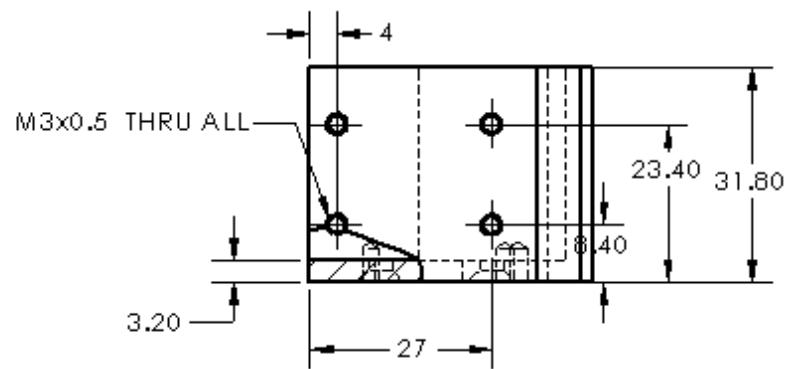
SHEET 1 OF 1

SCALE 2:3

REV

SIZE

A



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL ± .
ONE PLACED DECIMAL ± .1
ANGLE: ± 1°

INTERPRET DRAWING
PER ANSI Y14.5 2009



MATERIAL: AL-6061

TITLE: REAR LEFT MOTOR HOUSING

DRAWN BY:

CG

DWG #:

323

SHEET 1 OF 1

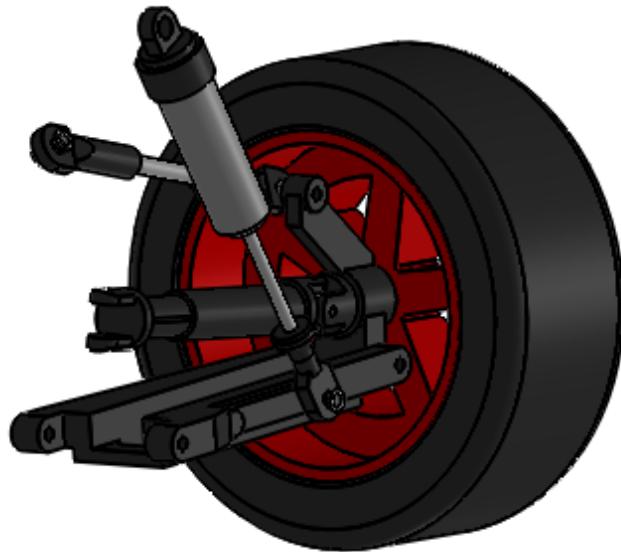
SCALE: 1:1

REV

SIZE
A

CAL POLY
SAN LUIS OBISPO

4X4 TRAXXAS SLASH
DRIVETRAIN AND
SUSPENSION
ASSEMBLY



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACED DECIMAL $\pm .1$
ANGLES $\pm 1^\circ$

INTERPRET DRAWING
PER ANSI Y14.5 2009

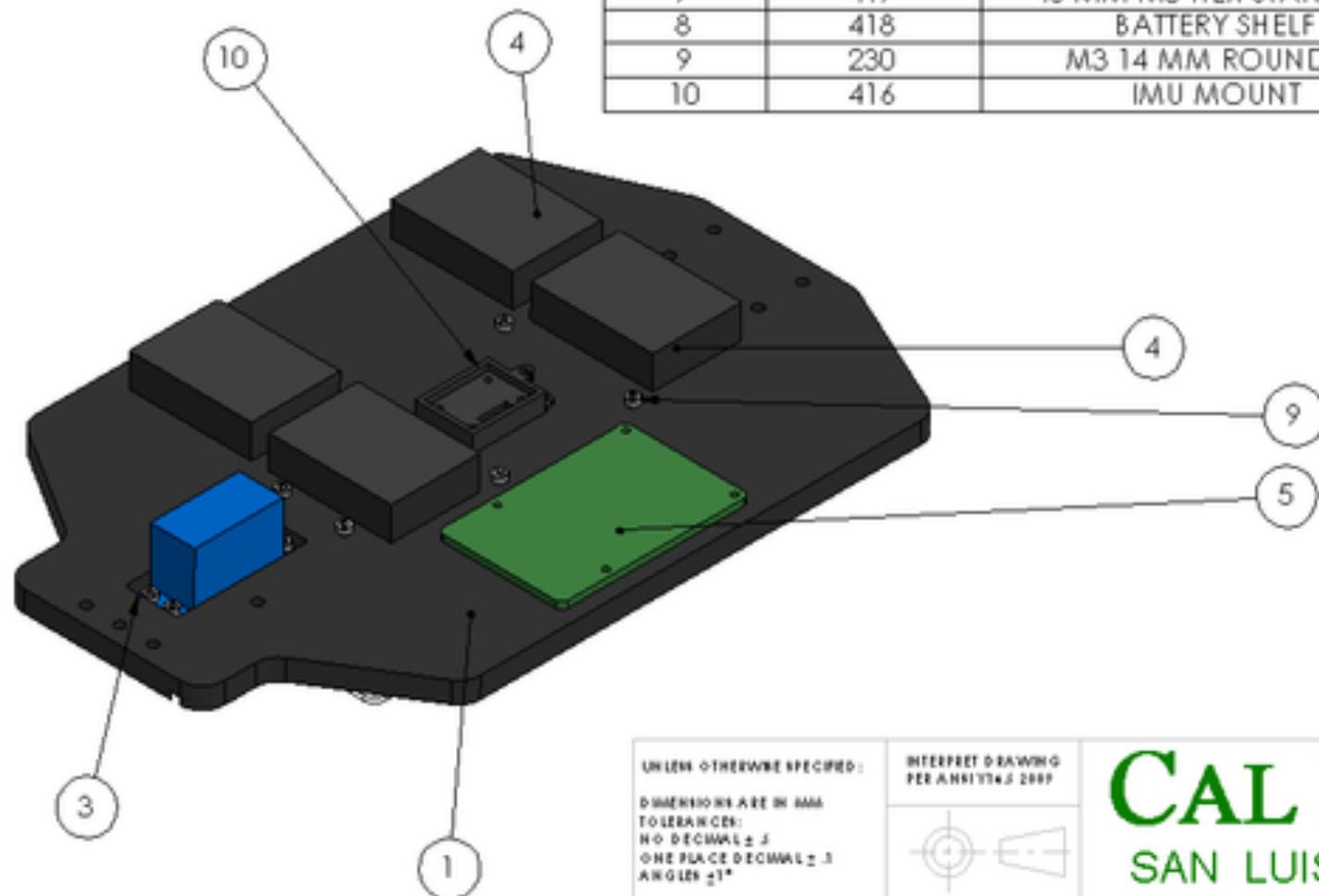


CAL POLY
SAN LUIS OBISPO

MATERIAL: MISC TITLE: REAR LEFT TRAXXAS ASSEMBLY

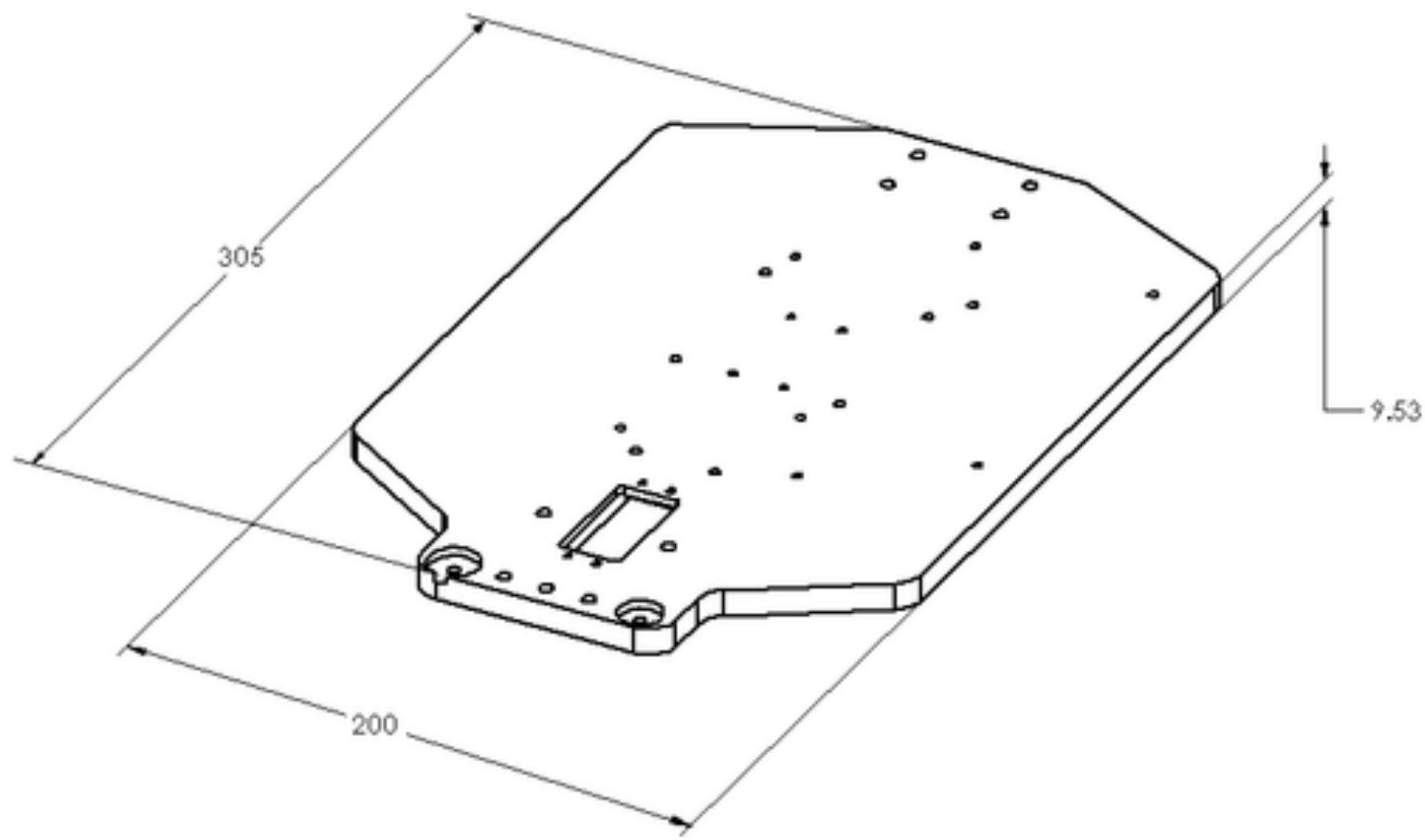
DRAWN BY: CG DWG #: 322 SHEET 1 OF 1 SCALE: 2:3 REV: SIZE: **A**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	401	CHASSIS	1
3	402	TRAXXAS SERVO	1
4	404	MAXON MOTOR DRIVER	4
5	408	RASPBERRY PI/CIRCUIT BOARD	1
6	209	M3 X 0.5 10MM SOCKET	4
7	417	45 MM M3 HEX STANDOFF	6
8	418	BATTERY SHELF	1
9	230	M3 14 MM ROUNDED	6
10	416	IMU MOUNT	1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: NO DECIMALS ± . ONE PLACE DECIMAL ± . ANGLES ± 1°	INTERPRET DRAWING PER ASME Y14.5 2009
MATERIAL: VARIOUS	TITLE: CHASSIS ASSEMBLY
DRAWN BY: CG	DWG #: 400
	SHEET 1 OF 1
	SCALE: 1:2
	REV: A
	SIZE

CAL POLY
SAN LUIS OBISPO



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES:
NO DECIMAL $\pm .5$
ONE PLACE DECIMAL $\pm .1$
ANGLES $\pm 1^\circ$

INTERPRET DRAWING
PER ANNOTATIONS 2009



MATERIAL: Nylon (6)

TITLE:

CAL POLY
SAN LUIS OBISPO

DRAWN BY:

CG

DWG #:

401A

SHEET 1 OF 1

SCALE: 1:2

REV:

SIZE

A

402 – Traxxas Servo

Waterproof Digital Micro Servo

- 41.7 oz-in torque
- Transit time 0.11 sec/60°

Part #2080



403 – Traxxas Receiver



Waterproof Receiver Box (#3924) with TQi TSM Traxxas Link Receiver (#6533)

404 – Maxon Motor Driver Datasheet (EPOS4 Compact 50/5 CAN)

maxon motor

EPOS4

Feature Chart

maxon motor control's EPOS4 products are small-sized, full digital, smart positioning control units. Their high power density allows flexible use for brushed DC and brushless EC (BLDC) motors up to approximately 750 Watts with various feedback options, such as Hall sensors, incremental encoders as well as absolute sensors in a multitude of drive applications.

EPOS4 controllers are specially designed to be commanded and controlled as a slave node in the CANopen network. In addition, the units can be operated via any USB or RS232 communication port of a Windows or Linux workstation. Moreover, the integrated extension interface allows optional communication interfaces, such as EtherCAT or other additional functionalities.

Latest technology, such as field-oriented control (FOC) and acceleration/velocity feed forward in combination with highest control cycle rates allow sophisticated, ease-of-use motion control.



epos.maxonmotor.com

Legend: ✓ = included / nnnnnn = order number / ** = available shortly

	EPOS4 Module 24/1.5 (536630)	EPOS4 Compact 24/1.5 CAN (546714)	EPOS4 Module 50/5 (534130)	EPOS4 Compact 50/5 CAN (541718)	EPOS4 Module 50/8 (504384)	EPOS4 Compact 50/8 CAN (520885)	EPOS4 Module 50/15 (504383)	EPOS4 Compact 50/15 CAN (520886)
 for comparison purposes: US Half Dollar coin (Ø30.6 mm)								
Communication Interfaces								
CANopen Slave	max. 1 Mbit/s							
CANopen Application Layer and Communication Profile	CiA 301							
CANopen Layer Setting Services and Protocol (LSS)	CiA 305**							
CANopen Device Profile Drives and Motion Control	CiA 402							
USB 2.0 / USB 3.0	Full speed							
Gateway function USB-to-CAN	✓							
RS232	max. 115'200 bit/s							
Gateway function RS232-to-CAN	✓							
EtherCAT Slave (IEC 61158)	with optional extension module**							
Motors								
Brushed DC motors up to (continuous / max.)	36 W / 108 W	36 W / 108 W	250 W / 750 W	250 W / 750 W	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W
Brushless EC motors (BLDC) up to (continuous / max.)	36 W / 108 W	36 W / 108 W	250 W / 750 W	250 W / 750 W	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W

 BOSCH	BNO055 Data sheet	Page 2
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BNO055

**INTELLIGENT ABSOLUTE ORIENTATION SENSOR, 9-AXIS SENSOR FUSION
ALL-IN-ONE WINDOWS 8.x COMPLIANT SENSOR HUB**

Basic Description

Key features:

- Outputs fused sensor data
- 3 sensors in one device
- Small package
- Power Management
- Common voltage supplies
- Digital interface
- Consumer electronics suite

Quaternion, Euler angles, Rotation vector,
Linear acceleration, Gravity, Heading
an advanced triaxial 16bit gyroscope, a versatile,
leading edge triaxial 14bit accelerometer and a
full performance geomagnetic sensor
LGA package 28 pins
Footprint 3.8 x 5.2 mm², height 1.13 mm²
Intelligent Power Management: normal,
low power and suspend mode available
 V_{DD} voltage range: 2.4V to 3.6V
HID-I2C (Windows 8 compatible), I²C, UART
 V_{DDIO} voltage range: 1.7V to 3.6V
MSL1, RoHS compliant, halogen-free
Operating temperature: -40°C ... +85°C

Key features of integrated sensors:

Accelerometer features

- Programmable functionality
- On-chip interrupt controller

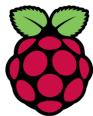
Acceleration ranges $\pm 2g/\pm 4g/\pm 8g/\pm 16g$
Low-pass filter bandwidths 1kHz - <8Hz

Operation modes:

- Normal
- Suspend
- Low power
- Standby
- Deep suspend

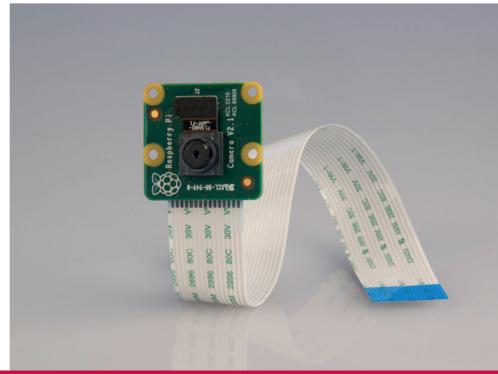
Motion-triggered interrupt-signal generation for

- any-motion (slope) detection
- slow or no motion recognition
- high-g detection



Raspberry Pi

Camera Module



Product Name	Raspberry Pi Camera Module
Product Description	High Definition camera module compatible with all Raspberry Pi models. Provides high sensitivity, low crosstalk and low noise image capture in an ultra small and lightweight design. The camera module connects to the Raspberry Pi board via the CSI connector designed specifically for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the processor.
RS Part Numer	913-2664
Specifications	
Image Sensor	Sony IMX 219 PQ CMOS image sensor in a fixed-focus module.
Resolution	8-megapixel
Still picture resolution	3280 x 2464
Max image transfer rate	1080p: 30fps (encode and decode) 720p: 60fps
Connection to Raspberry Pi	15-pin ribbon cable, to the dedicated 15-pin MIPI Camera Serial Interface (CSI-2).
Image control functions	Automatic exposure control Automatic white balance Automatic band filter Automatic 50/60 Hz luminance detection Automatic black level calibration
Temp range	Operating: -20° to 60° Stable image: -20° to 60°
Lens size	1/4"
Dimensions	23.86 x 25 x 9mm
Weight	3g

HRLV-MaxSonar® - EZ™ Series

High Resolution, Precision, Low Voltage Ultrasonic Range Finder MB1003, MB1013, MB1023, MB1033, MB1043

The HRLV-MaxSonar-EZ sensor line is the most cost-effective solution for applications where precision range-finding, low-voltage operation, and low-cost are needed. This sensor component module allows users of other more costly precision rangefinders to lower the cost of their systems without sacrificing performance.



The HRLV-MaxSonar-EZ sensor line provides high accuracy and high resolution ultrasonic proximity detection and ranging in air, in a package less than one cubic inch. This sensor line features 1-mm resolution, target-size and operating-voltage compensation for improved accuracy, superior rejection of outside noise sources, internal speed-of-sound temperature compensation and optional external speed-of-sound temperature compensation. This ultrasonic sensor detects objects from 1-mm to 5-meters, senses range to objects from 30-cm to 5-meters, with large objects closer than 30-cm are typically reported as 30-cm¹. The interface output formats are pulse width, analog voltage, and serial digital in either RS232 or TTL. Factory calibration is standard. ¹See Close Range Operation

Precision Range Sensing

- Range-finding at a fraction of the cost of other precision rangefinders
- Reading-to-reading stability of 1-mm at 1-meter is typical
- Accuracy is factory-matched at 1-meter to 0.1% providing a typical large target accuracy of 1% or better for most voltages and uses²
- Calibrated acoustic detection zones allows selection of the part number that matches a specific application
- Compensation for target size variation and operating voltage range
- Standard internal temperature compensation and optional external temperature compensation

Range Outputs

- Pulse width, (1uS/mm)
- Analog Voltage, (5mm resolution)
- Serial, (RS232 or TTL using solder-able jumper or volume orders available as no-cost factory installed jumper)

Easy to Use Component Module

- Gracefully handles other ultrasonic sensors⁴
- Stable and reliable range readings and excellent noise rejection make the sensor easy to use
- Easy to use interface with distance provided in a variety of outputs
- Target size compensation provides greater consistency and accuracy when switching targets
- Sensor automatically handles acoustic noise^{2,3}
- Sensor ignores other acoustic noise sources
- Small and easy to mount
- Calibrated sensor eliminates most sensor to sensor variations
- Very low power ranger, excellent for multiple sensors or battery based systems

General Characteristics

- Low-cost ultrasonic rangefinder
- Size less than 1 cubic inch with easy mounting

- Object proximity detection from 1-mm to 5-meters
- Resolution of 1-mm
- Excellent³ Mean Time Between Failure (MTBF)
- Triggered operation yields a real-time 100mS measurement cycle
- Free run operation uses a 2Hz filter, with 100mS measurement and output cycle
- Operating temperature range from -15°C to +65°C, provided proper frost prevention is employed
- Operating voltage from 2.5V to 5.5V
- Nominal current draw of 2.5mA at 3.3V, and 3.1mA at 5V
- Low current draw reduces current drain for battery operation
- Fast first reading after power-up eases battery requirements

Notes:

² Users are encouraged to evaluate the sensor performance in their application.

³ By design.

⁴ See page 5 for multi-sensor operation

Close Range Operation

Applications requiring 100% reading-to-reading reliability should not use MaxSonar sensors at a distance closer than 30cm. Although most users find MaxSonar sensors to work reliably from 0 to 30cm for detecting objects in many applications, MaxBotix® Inc. does not guarantee operational reliability for objects closer than the minimum reported distance. Because of ultrasonic physics, these sensors are unable to achieve 100% reliability at close distances.

Warning: Personal Safety Applications

We do not recommend or endorse this product be used as a component in any personal safety applications. This product is not designed, intended or authorized for such use. These sensors and controls do not include the self-checking redundant circuitry needed for such use. Such unauthorized use may create a failure of the MaxBotix® Inc. product which may result in personal injury or death. MaxBotix® Inc. will not be held liable for unauthorized use of this component.



Raspberry Pi

Raspberry Pi 3 Model B



Product Name

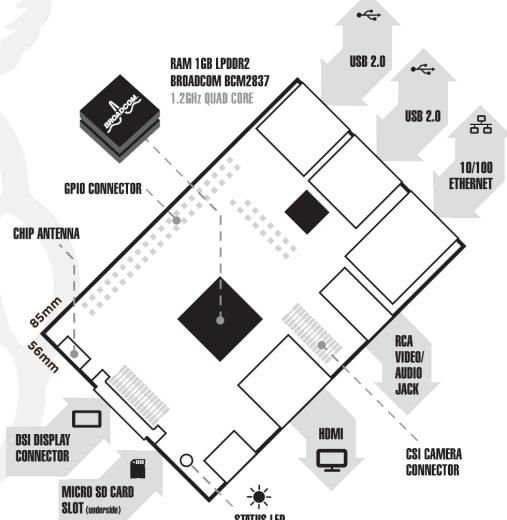
Raspberry Pi 3

Product Description

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

RS Part Number

896-8660



Raspberry Pi

Raspberry Pi 3 Model B

Specifications

Processor

Broadcom BCM2837 chipset.

1.2GHz Quad-Core ARM Cortex-A53

802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)

GPU

Dual Core VideoCore IV® Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode.

Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure

Memory

1GB LPDDR2

Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT

85 x 56 x 17mm

Micro USB socket 5V1, 2.5A

Connectors:

10/100 BaseT Ethernet socket

HDMI (rev 1.3 & 1.4)

Composite RCA (PAL and NTSC)

Video Output

Audio Output 3.5mm jack, HDMI

USB 4 x USB 2.0 Connector

GPIO Connector

40-pin 2.54 mm (100 mil) expansion header: 2x20 strip

Providing 27 GPIO pins as well as +3.3 V, +5 V and GND supply lines

Camera Connector

15-pin MIPI Camera Serial Interface (CSI-2)

Display Serial Interface (DSI) 15 way flat flex cable connector with two data lanes and a clock lane

Push/pull Micro SDIO

Key Benefits

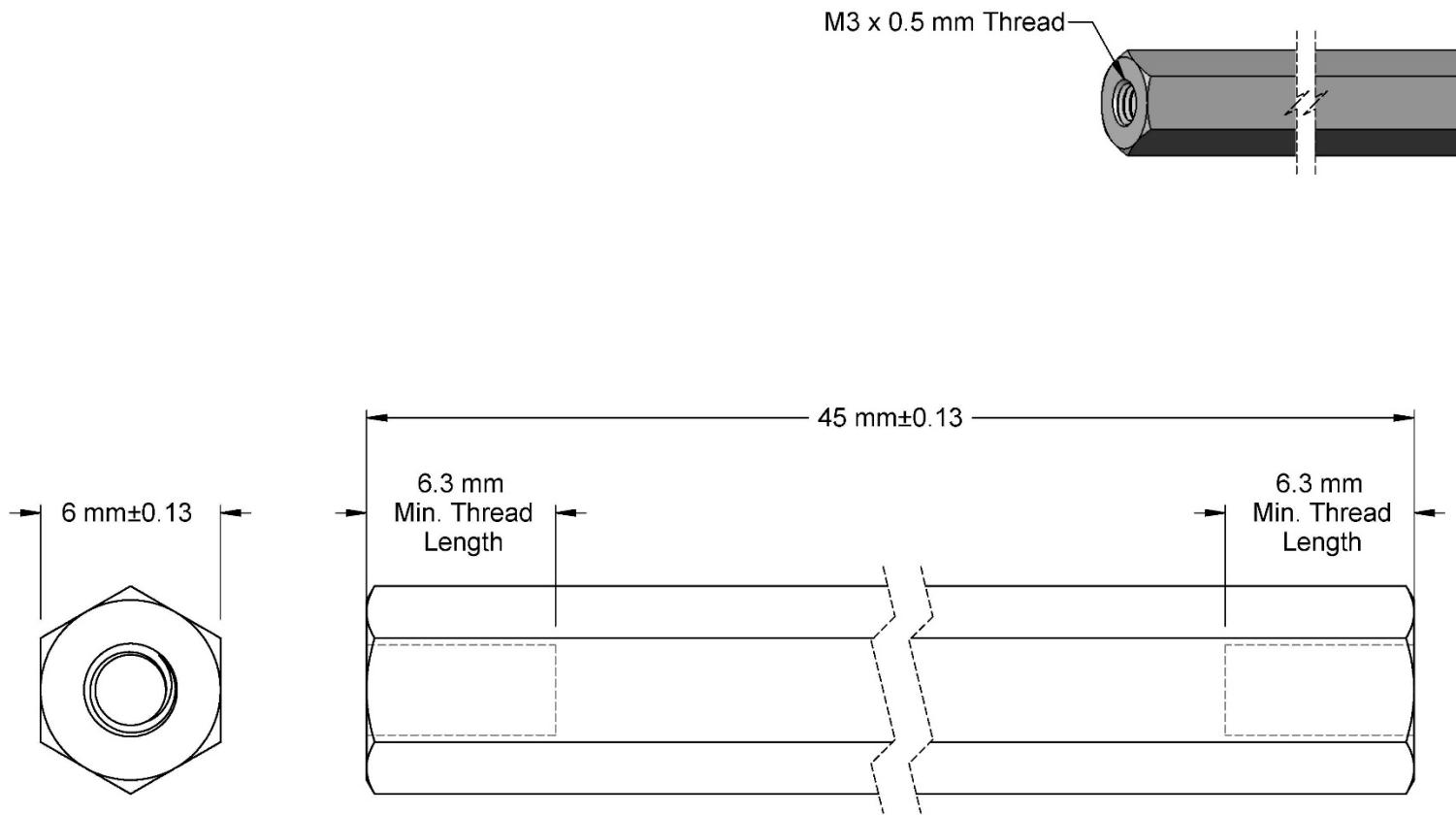
- Low cost
- 10x faster processing
- Consistent board format
- Added connectivity

Key Applications

- Low cost PC/tablet/laptop
- Media centre
- Industrial/Home automation
- Print server
- Web camera
- Wireless access point
- IoT applications
- Robotics
- Server/cloud server
- Security monitoring
- Gaming
- Environmental sensing/monitoring (e.g. weather station)

ZIPPY Compact 4000mAh 7S 25C Lipo Pack





McMASTER-CARR CAD

<http://www.mcmaster.com>

© 2015 McMaster-Carr Supply Company

Information in this drawing is provided for reference only.

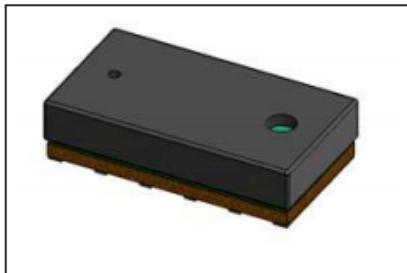
PART
NUMBER **411**

Female Threaded
Hex Standoff



World smallest Time-of-Flight ranging and gesture detection sensor

Datasheet - production data



Features

- Fully integrated miniature module
 - 940nm Laser VCSEL
 - VCSEL driver
 - Ranging sensor with advanced embedded micro controller
 - 4.4 x 2.4 x 1.0mm
- Fast, accurate distance ranging
 - Measures absolute range up to 2m
 - Reported range is independent of the target reflectance
 - Operates in high infrared ambient light levels
 - Advanced embedded optical cross-talk compensation to simplify cover glass selection
- Eye safe
 - Class 1 laser device compliant with latest standard IEC 60825-1:2014 - 3rd edition
- Easy integration
 - Single reflowable component
 - No additional optics
 - Single power supply
 - I2C interface for device control and data transfer
 - Xshutdown (Reset) and interrupt GPIO
 - Programmable I2C address

Applications

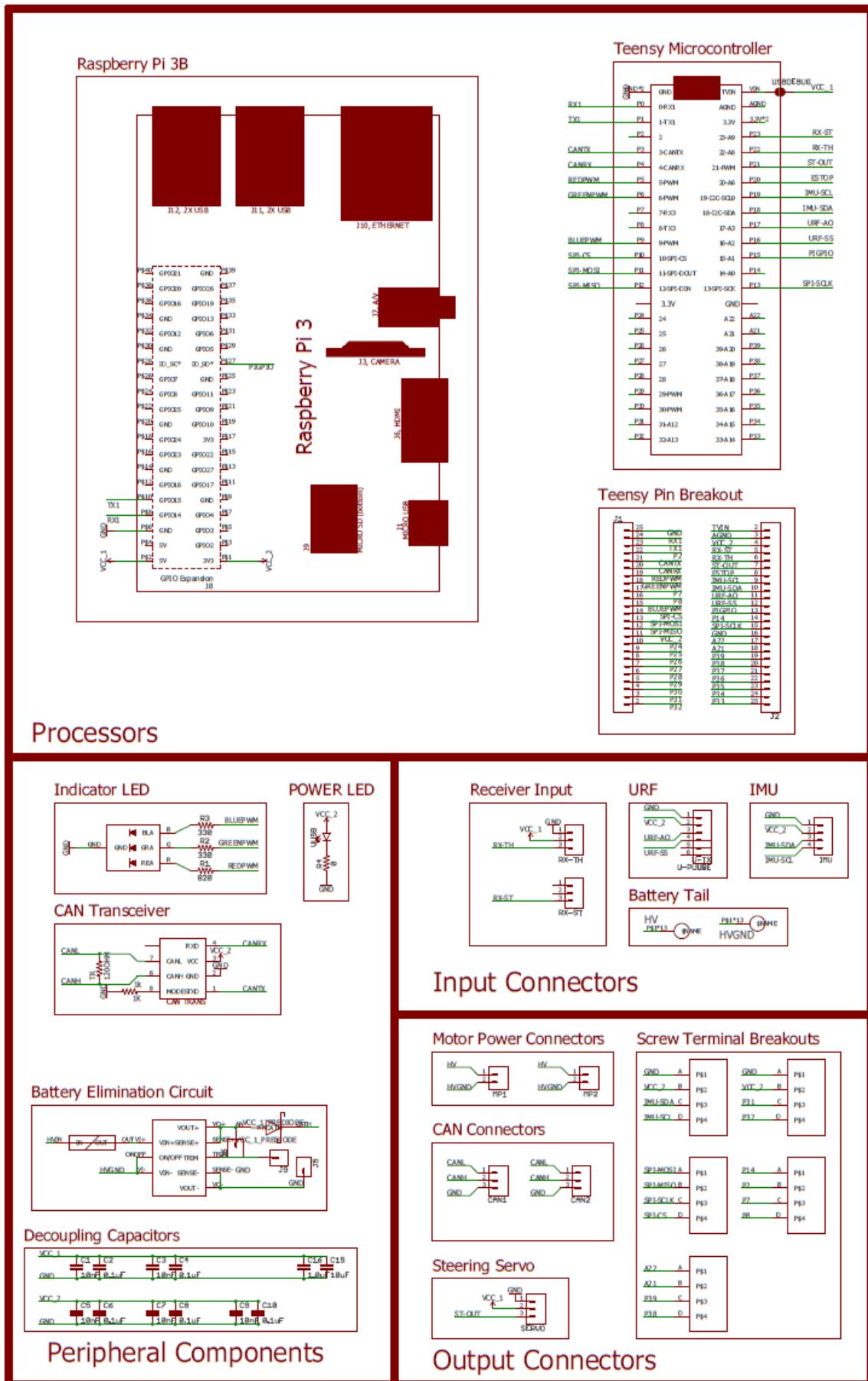
- User detection for Personal Computers/ Laptops/Tablets and IoT (Energy saving).
- Robotics (obstacle detection).
- White goods (hand detection in automatic faucets, soap dispensers etc...)
- 1D gesture recognition.
- Laser assisted Auto-Focus. Enhances and speeds-up camera AF system performance, especially in difficult scenes (low light levels, low contrast) or fast moving video mode.

Description

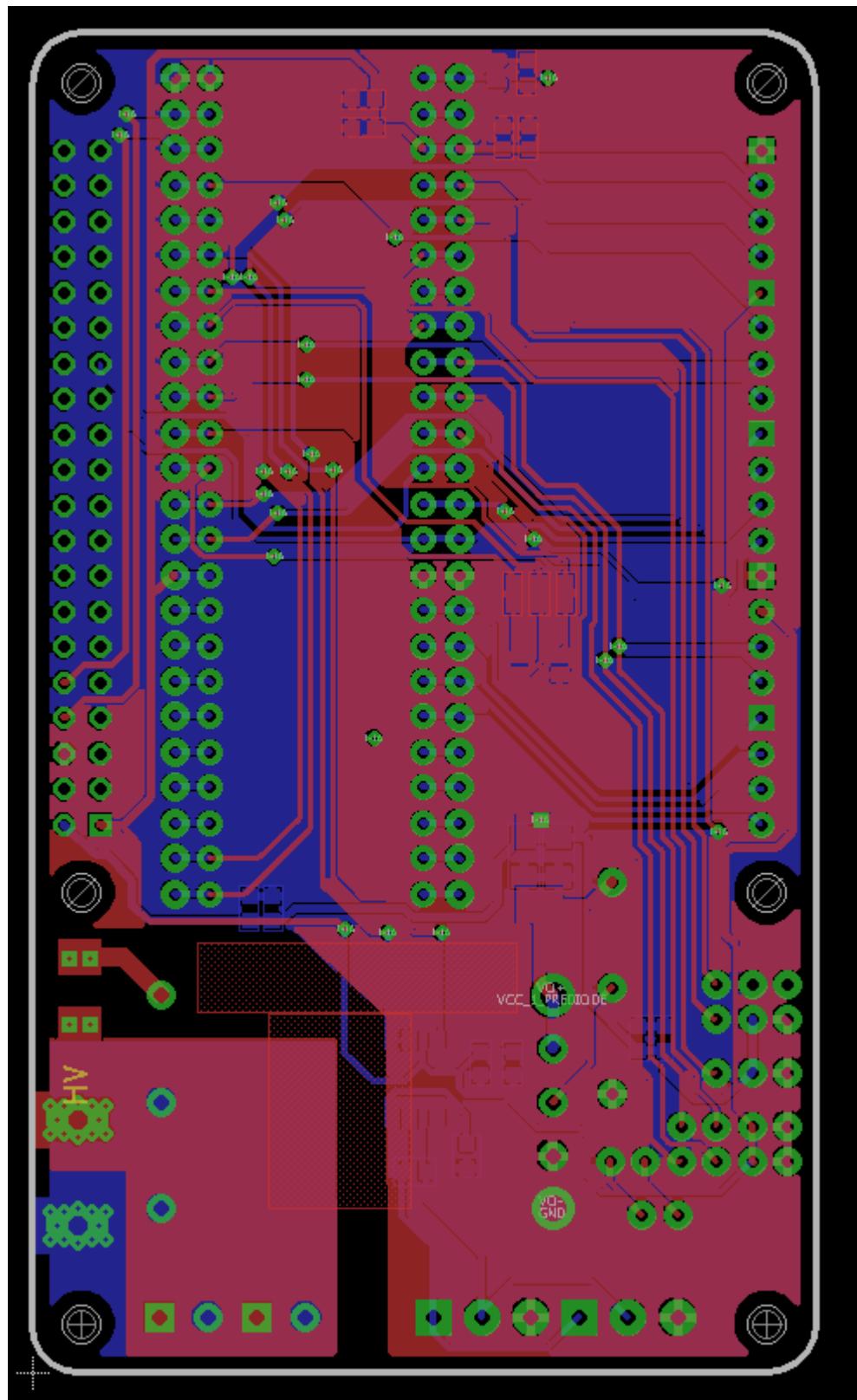
The VL53L0X is a new generation Time-of-Flight (ToF) laser-ranging module housed in the smallest package on the market today, providing accurate distance measurement whatever the target reflectances unlike conventional technologies. It can measure absolute distances up to 2m, setting a new benchmark in ranging performance levels, opening the door to various new applications.

The VL53L0X integrates a leading-edge SPAD array (Single Photon Avalanche Diodes) and embeds ST's second generation FlightSense™ patented technology.

The VL53L0X's 940nm VCSEL emitter (Vertical Cavity Surface-Emitting Laser), is totally invisible to the human eye, coupled with internal physical infrared filters, it enables longer ranging distance, higher immunity to ambient light and better robustness to cover-glass optical cross-talk.



421 – Motherboard Layout

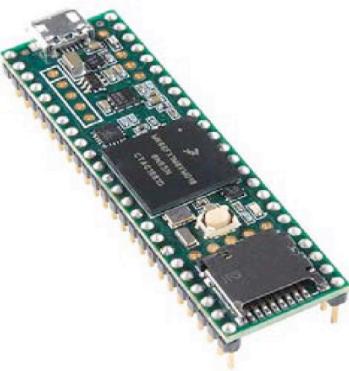


422 – Teensy 3.6 Datasheet



Teensy 3.6 (Headers)

DEV-14058 RoHS



Description: The Teensy is a breadboard-friendly development board with loads of features in a, well, teensy package. Each Teensy 3.6 comes with headers already attached and pre-flashed with a bootloader so you can program it using the onboard USB connection; no external programmer needed! You can program for the Teensy in your favorite program editor using C, or you can install the Teensyduino add-on for the Arduino IDE and write Arduino sketches for it!

The processor on the Teensy also has access to the USB and can emulate any kind of USB device you need it to be, making it great for USB-MIDI and other HID projects. The 32-bit, 180MHz processor brings a few other features to the table as well, such as multiple channels of Direct Memory Access, several high-resolution ADCs and even an I₂S digital audio interface! There are also four separate interval timers, plus a delay timer! Oh yeah, and all digital pins have interrupt capability and are 3.3V tolerant.

All of this functionality is jammed into a 62.3mm x 18mm board with all headers on a 0.1" grid so you can slap it on a breadboard and get to work! The Teensy 3.6 (as well as its sibling, the Teensy 3.5) is larger, faster and capable of more complex projects, especially with its onboard microSD card port. An upgraded ARM Cortex MCU (180MHz from 72MHz), more memory (1M from 256K)—as well as more RAM, EEPROM and accessible pins—make up the key new features of this board. The Teensy 3.6 is slightly scaled up from the Teensy 3.5.

Note: This does not come with a USB cable.

Dimensions: 62.3mm x 18mm x 4.2mm (2.5in x 0.7in x 0.2in)

Features:

- 180 MHz ARM Cortex-M4 with Floating Point Unit
- 1M Flash, 256K RAM, 4K EEPROM
- Microcontroller Chip MK66FX1M0VMD18
- USB High Speed (480Mbit/sec) Port
- 2 CAN Bus Ports
- 32 General Purpose DMA Channels
- 22 PWM Outputs
- 4 I₂C Ports
- 11 Touch-Sensing Inputs
- 62 I/O Pins (42 breadboard friendly)
- 25 Analog Inputs to 2 ADCs with 13-bit resolution
- 2 Analog Outputs (DACs) with 12-bit resolution
- USB Full-Speed (12Mbit/sec) Port
- Ethernet mac, capable of full 100Mbit/sec speed
- Native (4-bit SDIO) microSD card port
- I₂S Audio Port, 4-Channel Digital Audio Input and Output
- 14 Hardware Timers
- Cryptographic Acceleration Unit
- Random Number Generator
- CRC Computation Unit
- 6 Serial Ports (2 with FIFO and Fast Baud Rates)
- 3 SPI Ports (1 with FIFO)
- Real-Time Clock (RTC)
- Pre-soldered Headers

423 – Voltage Regulator Datasheet

GE

Data Sheet

SHHD003A0A Hammerhead* Series; DC-DC Converter Power Modules 18-75Vdc Input; 5.0Vdc, 3A, 15W Output



RoHS Compliant

Applications

- Wireless Networks
- Hybrid power architectures
- Optical and Access Network Equipment
- Enterprise Networks including Power over Ethernet (PoE)
- Industrial markets

Options

- Negative Remote On/Off logic
- Surface Mount/Tape and Reel (-SR Suffix)

Description

The SHHD003A0A Hammerhead series power modules are isolated dc-dc converters that operate over an ultra-wide input voltage range of 18 Vdc -75Vdc and provide a single precisely regulated output voltage at 5.0Vdc. This series is a low cost, smaller size alternative to the existing LW/LAW/LC/SC/SW with enhanced performance parameters. The output is fully isolated from the input, allowing versatile polarity configurations and grounding connections. The modules exhibit high efficiency of 87.0% typical at full load. Built-in filtering for both input and output minimizes the need for external filtering. The module is fully self-protected with output over-current and over-voltage, over-temperature and input under voltage shutdown control. Optional features include negative or positive on/off logic and SMT connections.

Features

- Compliant to RoHS II EU "Directive 2011/65/EU (-Z versions)
- Compliant to REACH Directive (EC) No 1907/2006
- Ultra-wide Input Voltage Range, 18Vdc to 75Vdc
- No minimum load
- High efficiency - 87.0% at full load ($V_{in}=24$ or 48Vdc)
- Constant switching frequency
- Low output ripple and noise
- Small Size and low profile, follows industry standard 1x1 footprint
27.9mm x 24.4mm x 8.5mm (MAX)
(1.10 x 0.96 x 0.335 in)
- Surface mount (SMT) or Through hole (TH)
- Reflow process compliant, both SMT and TH versions
- Positive Remote On/Off logic
- Output overcurrent/voltage protection (hiccup)
- Over-temperature protection
- Output Voltage adjust: 90% to 110% of $V_{o,nom}$
- Wide operating temperature range (-40°C to 85°C)
- CAN/CSA[†] C22.2 No. 60950-1-07, 2nd Edition + A1:2011 (MOD), ANSI/UL[‡] 60950-1-2011, December 19, 2011; DIN EN 60950-1 (VDE[§] 0805-1):2011-01 DIN EN 60950-1/A12 (VDE 0805-1/A12):2011-08 EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 IEC 60950-1:2005 (2nd Edition); am1:2009
- CE mark meets 2006/95/EC directive[§]
- Meets the voltage and current requirements for ETSI 300-132-2 and complies with and licensed for Basic insulation rating per EN60950-1
- 2250 Vdc Isolation tested in compliance with IEEE 802.3[¶] PoE standards
- ISO** 9001 and ISO 14001 certified manufacturing facilities

* Trademark of General Electric Company

[#] UL is a registered trademark of Underwriters Laboratories, Inc.

[†] CSA is a registered trademark of Canadian Standards Association.

[‡] VDE is a trademark of Verband Deutscher Elektrotechniker e.V.

[§] This product is intended for integration into end-user equipment. All of the required procedures of end-use equipment should be followed.

[¶] IEEE and 802 are registered trademarks of the Institute of Electrical and Electronics Engineers, Incorporated.

^{**} ISO is a registered trademark of the International Organization of Standards.

SN65HVD23x 3.3-V CAN Bus Transceivers**1 Features**

- Operates with a single 3.3 V Supply
- Compatible With ISO 11898-2 Standard
- Low Power Replacement for the PCA82C250 Footprint
- Bus Pin ESD Protection Exceeds ± 16 kV HBM
- High Input Impedance Allows for Up to 120 Nodes on a Bus
- Adjustable Driver Transition Times for Improved Emissions Performance
 - SN65HVD230 and SN65HVD231
- SN65HVD230: Low Current Standby Mode
 - 370 μ A Typical
- SN65HVD231: Ultra Low Current Sleep Mode
 - 40 nA Typical
- Designed for Data Rates⁽¹⁾ up to 1 Mbps
- Thermal Shutdown Protection
- Open Circuit Fail-Safe Design
- Glitch Free Power Up and Power Down Protection for Hot Plugging Applications

⁽¹⁾ The signaling rate of a line is the number of voltage transitions that are made per second expressed in the units bps (bits per second).

2 Applications

- Industrial Automation, Control, Sensors and Drive Systems
- Motor and Robotic Control
- Building and Climate Control (HVAC)
- Telecom and Basestation Control and Status
- CAN Bus Standards Such as CANopen, DeviceNet, and CAN Kingdom

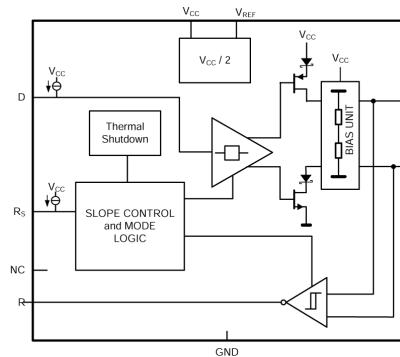
3 Description

The SN65HVD230, SN65HVD231, and SN65HVD232 controller area network (CAN) transceivers are compatible to the specifications of the ISO 11898-2 High Speed CAN Physical Layer standard (transceiver). These devices are designed for data rates up to 1 megabit per second (Mbps), and include many protection features providing device and CAN network robustness. The SN65HVD23x transceivers are designed for use with the Texas Instruments 3.3 V μ Ps, MCUs and DSPs with CAN controllers, or with equivalent protocol controller devices. The devices are intended for use in applications employing the CAN serial communication physical layer in accordance with the ISO 11898 standard.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN65HVD230		
SN65HVD231	SOIC (8)	4.90 mm \times 3.91 mm
SN65HVD232		

⁽¹⁾ For all available packages, see the orderable addendum at the end of the datasheet.

Equivalent Input and Output Schematic Diagrams

Kingbright

3.5x2.8mm SURFACE MOUNT LED LAMP



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
DISCHARGE
SENSITIVE
DEVICES

Part Number: AAA3528LSEEZGKQBKS

Hyper Red
Green
Blue

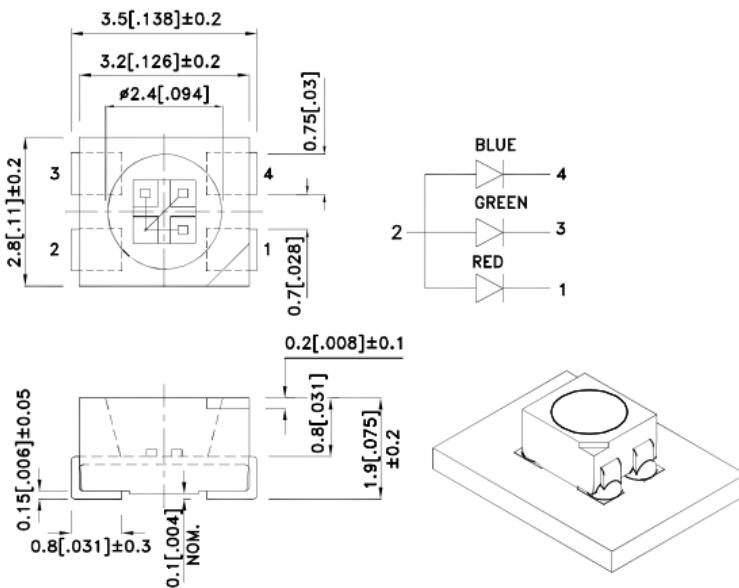
Features

- Suitable for all SMD assembly and solder process.
- Available on tape and reel.
- Package: 2000pcs / reel.
- Moisture sensitivity level : level 3.
- Low current IF=2mA operating.
- RoHS compliant.

Descriptions

- The Hyper Red source color devices are made with AlGaN/P on GaAs substrate Light Emitting Diode.
- The Green source color devices are made with InGaN on Sapphire Light Emitting Diode.
- The Blue source color devices are made with InGaN on Sapphire Light Emitting Diode.
- Electrostatic discharge and power surge could damage the LEDs.
- It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
- All devices, equipments and machineries must be electrically grounded.

Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25(0.01") unless otherwise noted.
3. The specifications, characteristics and technical data described in the datasheet are subject to change without prior notice.
4. The device has a single mounting surface. The device must be mounted according to the specifications.



SPEC NO: DSAO4456

REV NO: V.2B

DATE: SEP/18/2015

PAGE: 1 OF 8

APPROVED: Wynec

CHECKED: Allen Liu

DRAWN: M.Liu

ERP: 1201008965

Kingbright

1.6X0.8mm SMD CHIP LED LAMP



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
DISCHARGE
SENSITIVE
DEVICES

Part Number: APT1608LZGCK Green

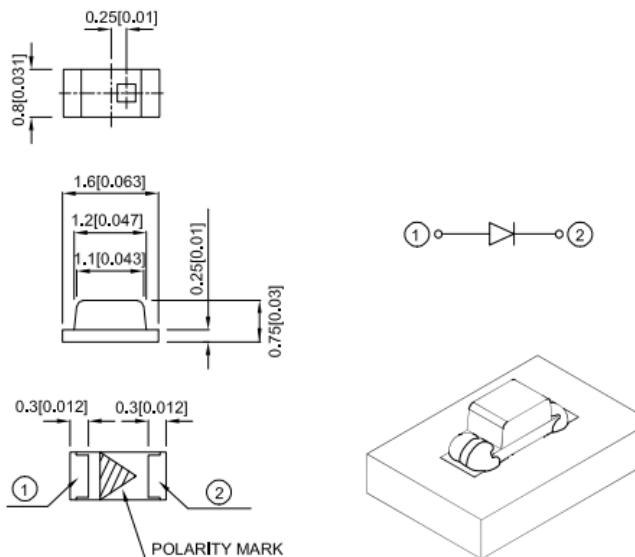
Features

- 1.6mmX0.8mm SMT LED, 0.75mm thickness.
- Low power consumption.
- Wide viewing angle.
- Ideal for backlight and indicator.
- Package: 2000pcs / reel .
- Moisture sensitivity level : level 3.
- Low current IF=2mA operating.
- RoHS compliant.

Descriptions

- The Green source color devices are made with InGaN on Sapphire Light Emitting Diode.
- Electrostatic discharge and power surge could damage the LEDs.
- It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
- All devices, equipments and machineries must be electrically grounded.

Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.1(0.004")$ unless otherwise noted.
3. The specifications, characteristics and technical data described in the datasheet are subject to change without prior notice.
4. The device has a single mounting surface. The device must be mounted according to the specifications.



Schottky Barrier Rectifier Diode

Lead-less Chip Form



GENERAL DESCRIPTION

AVX Schottky rectifier diodes offer unique lead-less chip packaging technology which eliminates the lead frame wire bond to give the chip top-bottom symmetry for fewer mounting problems, better heat transfer, and current handling capability (compared to SOD devices).

FEATURES

- Lead-less chip form
- Low V_f
- High current capability
- Low power loss/high efficiency
- UL 94V-0 class package material
- Halogen free



APPLICATIONS

- Switch mode power supplies
- High frequency rectification
- Portable battery powered devices
- Reverse bias protection

MECHANICAL DATA

Case: FRP substrate with epoxy underfill
Terminations: 100% Sn plated (Pb-free), solderable per MIL-STD-750, Method 2026.
Operating Temperature: -55°C to 125°C
Storage Temperature: -55°C to 150°C

HOW TO ORDER

SD	3220	S	020	S	3R0
Series		Thickness		Vf	Current
Schottky	Size	S = Standard	Voltage	0.20 = 20V	0R1 = 0.1
Diodes	3220	T = Thin	0.30 = 30V	0.40 = 40V	0R2 = 0.2
	2114		0.60 = 60V	100 = 100V	0R3 = 0.3
	2010			150 = 150V	0R5 = 0.5
	1206			200 = 200V	1R0 = 1.0
	0805				
	0603				

LEAD-FREE
 RoHS COMPLIANT

AVX SCHOTTKY DIODE CURRENTS BY CASE SIZE

EIAJ	JEDEC	Size	Max Forward Current								
			.1A	.2A	.3A	.5A	1A	2A	3A	5A	8A
0603	SOD-523	●	●	●							
0805	SOD-323	●	●	●	●	●	●				
1206	SOD-123				●	●	●	●	●		
2010	SMA (D0-214AC)					●	●	●	●	●	
2114	SMB (D0-214AA)							●	●	●	●
3220	SMC (D0-214AB)							●	●		

1	2	3	4	5	6	7
E				SIGN	DATE	DESCRIPTION
						APPROVER
THIS IS CAD DRAWING, DO NOT REVISE MANUALLY!!!						

P.C.B. LAYOUT

POLE	2	3	4	5	6	7	8	9	10	11	12	
A	7.00	10.50	14.00	17.50	21.00	24.50	28.00	31.50	35.00	38.50	42.00	
B	3.50	7.00	10.50	14.00	17.50	21.00	24.50	28.00	31.50	35.00	38.50	
Tol.	± 0.10						± 0.15					
POLE	13	14	15	16	17	18	19	20	21	22	23	24
A	45.50	49.00	52.50	56.00	59.50	63.00	66.50	70.00	73.50	77.00	80.50	84.00
B	42.00	45.50	49.00	52.50	56.00	59.50	63.00	66.50	70.00	73.50	77.00	80.50
Tol.	± 0.20						± 0.30					

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Material:

- Terminal body
- (metal housing): Brass(CuZn)
- Terminal screw: Steel Plated Zinc
- Wire guard: Stainless steel
- Surface of solder tail: Tin plated
- Insulator(housing): Thermoplastic (UL94V-0)

Electrical: cULus

- Voltage rating: 125V
- Current rating: 10A
- Wire range:
 - Solid wire(AWG): 16-26
 - Stranded wire(AWG): 16-26
- Torque: 1.7Lb-In
- Screw: M2
- Wire strip length: 5-6mm
- Withstanding Voltage: 1.25 KV
- Operating temperature: -40°C to +115°C
- Soldering temperature: 250°C±10°C/5 Sec
- Safety Approval: cULus

RoHS Compliant

PART NUMBER

OSTTEXX0164

No. of Poles _____

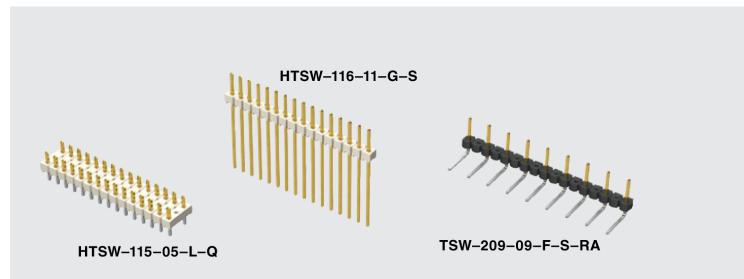
02: 2 Poles
03: 3 Poles
...
24: 24 Poles

COLOR
0: Black
5: Green
6: Blue (Standard)
8: Grey

OST	ON-SHORE TECHNOLOGY, INC.		
TITLE	OSTTE 3.5mm Solid block series "—" Screw		
PART NO.	PART NO. OSTTEXX0164		DWG NO. OSTTEXX0164.DWG
APPROVED	CHECKED	DESIGNED	DRAWN
		Runner 2010.03.26	Runner 2010.03.26
		UNIT: mm	Tolerance
		SCALE: NONE	X: ±0.50
			X: ±0.30
			X: ±0.10
			X*: ±1°
		SHEET: 01/01	REV.: C



(2.54 mm) .100"



THROUGH-HOLE .025" SQ POST HEADER

Board Mates:

SSW, SSQ, SSM, ESW, ESQ, BCS, BSW, CES, SLW

Cable Mates:

IDSD, IDSS, SMSD, SMSS

SPECIFICATIONS

For complete specifications see www.samtec.com?TSW or www.samtec.com?HTSW

Insulator Material:TSW: Black Glass Filled Polyester
HTSW: Natural Liquid Crystal Polymer**Terminal Material:**

Phosphor Bronze

Plating:Au or Sn over 50 μ " (1.27 μ m) Ni
.55 °C to +125 °C with Gold

-.55 °C to +105 °C with Tin

Voltage Rating:

550 VAC mated with SSW;

500 VAC mated with BCS or ESQ;

450 VAC-RAV/RE mated with BCS or SSM

400 VAC mated with CES

RoHS Compliant: Yes

Lead-Free Solderable:

HTSW: Yes

TSW: No, Lead Wave Only

CURRENT RATING (PER PIN)							
TSW mated with							
ESW	SSW	SLW	SSQ	SSM	BCS	SNT	
5.2 A	5.7 A	5.2 A	6.3 A	5.2 A	4.6 A	4.3 A	
1 POSITION POWERED PER ROW							

RECOGNITIONS

For complete scope of recognitions see www.samtec.com/quality

**ALSO AVAILABLE (MOQ Required)**

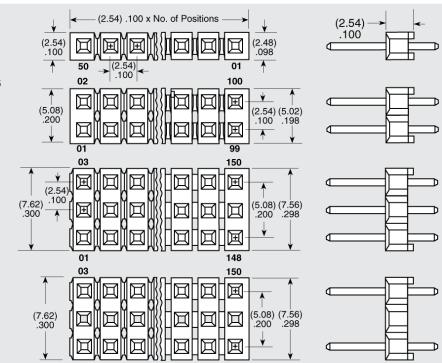
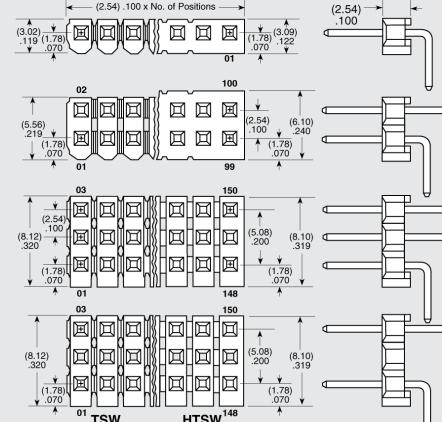
- Other platings
- Contact Samtec.

Note: Some lengths, styles and options are non-standard, non-returnable.

TYPE STRIP**TSW** = Standard Strip**HTSW** = Hi-Temp Strip**PIN CENTERS****-1** = .100" (2.54 mm) Centers, All Positions Filled**-2** = .200" (5.08 mm) Centers, Every Other Position Filled**NO. PINS PER ROW**

01 thru 50
=.100" (2.54 mm)
Center Version

02 thru 25
.200" (5.08 mm)
Center Version

Straight Pin Versions**Right-Angle Versions**

430 – Female Header Datasheet

POSITIONS	NO. OF CONTACTS SINGLE / DUAL	A		B	
		INCH	MM	INCH	MM
2	02/04	0.100	2.54	0.220	5.58
3	03/06	0.200	5.08	0.320	8.12
4	04/08	0.300	7.62	0.420	10.66
5	05/10	0.400	10.16	0.520	13.20
6	06/12	0.500	12.70	0.620	15.74
7	07/14	0.600	15.24	0.720	18.28
8	08/16	0.700	17.78	0.820	20.82
9	09/18	0.800	20.32	0.920	23.36
10	10/20	0.900	22.86	1.020	25.90
11	11/22	1.000	25.40	1.120	28.44
12	12/24	1.100	27.94	1.220	30.98
13	13/26	1.200	30.48	1.320	33.52
14	14/28	1.300	33.02	1.420	36.06
15	15/30	1.400	35.56	1.520	38.60
16	16/32	1.500	38.10	1.620	41.14
17	17/34	1.600	40.64	1.720	43.68
18	18/36	1.700	43.18	1.820	46.22
19	19/38	1.800	45.72	1.920	48.76
20	20/40	1.900	48.26	2.020	51.30
21	21/42	2.000	50.80	2.120	53.84
22	22/44	2.100	53.34	2.220	56.38
23	23/46	2.200	55.88	2.320	58.92
24	24/48	2.300	58.42	2.420	61.46
25	25/50	2.400	60.96	2.520	64.00
26	26/52	2.500	63.50	2.620	66.54
27	27/54	2.600	66.04	2.720	69.08
28	28/56	2.700	68.58	2.820	71.62
29	29/58	2.800	71.12	2.920	74.16
30	30/60	2.900	73.66	3.020	76.70
31	31/62	3.000	76.20	3.120	79.24
32	32/64	3.100	78.74	3.220	81.78
33	33/66	3.200	81.28	3.320	84.32
34	34/68	3.300	83.82	3.420	86.86
35	35/70	3.400	86.36	3.520	89.40
36	36/72	3.500	88.90	3.620	91.94
37	37/74	3.600	91.44	3.720	94.48
38	38/76	3.700	93.98	3.820	97.02
39	39/78	3.800	96.52	3.920	99.56
40	40/80	3.900	99.06	4.020	102.10

NOTES:

1. INSULATOR MATERIAL: SEE PART NUMBER CODING.
2. CONTACT MATERIAL: PHOSPHOR BRONZE.
3. CONTACT PLATING: SEE PART NUMBER CODING.
4. CURRENT RATING: 3 AMPS PER CONTACT.
5. VOLTAGE RATING: 250V AC/DC.
6. INSULATOR RESISTANCE: 5000 MEGOHMS MIN.
7. CONTACT RESISTANCE: 20 MILLIOHMS MAX.
8. DIELECTRIC WITHSTANDING: 500V AC.
9. OPERATING TEMPERATURE: -40° C TO +105° C.
10. *MAX PROCESSING TEMP.: SEE PART NUMBER CODING.
11. MATES WITH SULLINS .100 [2.54] CONTACT CENTER MALE HEADER SERIES.
(.025 [0.64] SQUARE POSTS)

*INDICATED TEMPERATURE AND TIME IS FOR COMPONENT INSULATOR. HIGHER PROCESSING TEMPERATURES MAY BE USED, PROVIDED HEAT IS APPLIED FROM BACK SIDE OF PCB, AND INSULATOR DOES NOT EXCEED INDICATED TEMPERATURE AND TIME.

PART NUMBER CODING
xPxCx xLFBN-RC

- NUMBER OF ROWS**
1 = SINGLE ROW
2 = DUAL ROWS
- NUMBER OF POSITIONS**
(CONTACTS PER ROW, 02 THRU 40)
- PLATING**
(.000030"~.000050" NICKEL UNDER PLATED)
P = GOLD FLASH OVERALL
T = TIN OVERALL
- INSULATOR MATERIAL**
P = POLYESTER, UL 94V-0.
PROCESSING TEMP. = WAVE ONLY.
N = NYLON 6T.
*PROCESSING TEMP. = 260° C FOR 10 SECS.

REVISIONS

REV.	ECO. NO.	DESCRIPTION	DATE	BY
E	1869	UPDATE MAX CONTACT DEPTH TOLERANCE & NOTE, ADD CONTACT PLATING NOTES	12/23/2008	JH
F	2055	UPDATE MIN. CONTACT DEPTH TO 2.20mm (WAS 3.175), MAX. CONTACT DEPTH TO 6.00mm (WAS 6.05), INSULATOR WIDTH TO 2.50mm (WAS 2.54) FOR 1-ROW, 5.08mm (WAS 5.00) FOR 2-ROW	11/12/2009	LH
G	2164	CORRECT STANDOFF ON THE RIGHT VIEW AND THE ISO VIEW.	7/28/2010	LH
H	2516	UPDATE CONTACT POINT DIST TO REF. ADD NOTE 10 PROCESSING TEMP. & NOTE 11 MATING PARTS	02/14/2012	LH

DUAL ROWS

SINGLE ROW

RECOMMENDED PCB LAYOUT SINGLE ROW
TOLERANCE: ±.002[±.05]

RECOMMENDED PCB LAYOUT DUAL ROWS
TOLERANCE: ±.002[±.05]

RoHS COMPLIANT

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [MM]

TOLERANCES: ANGULAR: ± 5° DECIMALS: X= .012 [0.30] Y= .016 [0.40] XXX= .006 [15]	DRAWN DATE NAME 12/15/2008 JH	SULLINS CONNECTOR SOLUTIONS
THE INFORMATION HEREIN CONTAINS TRADE SECRET AND PROPRIETARY INFORMATION WHICH IS THE PROPERTY OF SULLINS ELECTRONICS AND IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE. IT IS AUTHORIZED IN PRINTING BY AN OFFICIAL OF SULLINS ELECTRONICS.		TITLE HEADER FEMALE, 2.54mm CC, ST
PART NUMBER xPxCx xLFBN-RC		REV H
SIZE CAGE CODE DWG. NO. C 54453 10492	SCALE: 16:1	FILE NAME: 10492_PINxPxCxLFBN-RC

430 – LittleFuse Datasheet


Littlefuse®
 Expertise Applied | Answers Delivered

Surface Mount Fuses
NANO²® > 157 Fuse and Holder Combination

157 Series – Standard Nano²® Fuse and Clip Assembly



Description

The 157 Series – Standard Nano Fuse/Clip assembly is a small, square, very fast acting surface mount fuse that is assembled in surface mountable fuse clips. The fuse clip and pre-installed fuse combination can be automatically placed in PC Board in one efficient manufacturing operation. It permits quick and easy replacement of fuses without performing desoldering process, even in the field and without exposing the PC Board to detrimental effects of rework solder heat.

Features

- Surface Mountable, Very Fast Acting Fuse.
- Easily replaceable on PC Board (Field Replaceable)
- Fully compatible with RoHS/Pb-Free solder alloys and higher temperature profiles associated with leadfree assembly.
- RoHS compliant and Halogen Free
- Available in ratings of 0.062 ~ 10 Amperes.

Agency Approvals		
AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
cULus	E14721	0.062A ~ 10A
PS E	NBK030205-E10480A NBK030205-E10480B NBK10105-E184655	1A - 1.6A 2A - 5A 6.3A - 10A

Electrical Characteristics for Series	
% of Ampere Rating	Opening Time at 25°C
100%	4 hours Minimum
200%	5 secs. Maximum

Electrical Specifications by Item							
Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating (A)	Fuse Furnished	Nominal Cold Resistance (Ohms)	Nominal Melting Pt (A ² sec)	Agency Approvals
0.062	.062	125	50A @ 125 VAC/VDC 300A @ 32 VDC	0451.062	5.5372	0.00019	X
0.080	.080	125		0451.080	4.0500	0.00033	X
0.100	.100	125		0451.100	3.1000	0.00138	X
0.125	.125	125		0451.125	1.7059	0.00286	X
0.160	.160	125		0453.160	1.2157	0.0048	X
0.200	.200	125		0453.200	1.3971	0.00652	X
0.250	.250	125		0453.250	1.0496	0.01126	X
0.315	.315	125		0453.315	0.3881	0.0311	X
0.375	.375	125		0453.375	0.6100	0.0442	X
0.400	.400	125		0453.400	0.5600	0.0551	X
0.500	.500	125		0453.500	0.4200	0.0824	X
0.630	.630	125		0453.630	0.3050	0.1381	X
0.750	.750	125		0453.750	0.2450	0.2143	X
0.800	.800	125		0453.800	0.2120	0.2654	X
1.0	.001	125		0453.001	0.1530	0.6029	X X
1.25	.125	125		0453.125	0.078	0.664	X X
1.5	.015	125		0453.015	0.0634	0.853	X X
1.6	.016	125		0453.016	0.0580	1.060	X X
2.0	.002	125		0453.002	0.0373	0.530	X X
2.5	.025	125		0453.025	0.0288	1.029	X X
3.0	.003	125		0453.003	0.0229	1.650	X X
3.15	.315	125		0453.315	0.0215	1.920	X X
3.5	.035	125		0453.035	0.0203	2.469	X X
4.0	.004	125		0453.004	0.0163	3.152	X X
5.0	.005	125		0453.005	0.0127	5.566	X X
6.3	.063	125		0453.063	0.0098	9.17	X X
7.0	.007	125		0453.007	0.0092	10.32	X X
8.0	.008	125		0453.008	0.0079	20.23	X X
10.0	.010	125	35A @ 125 VAC / 50A @ 125 VDC 300A @ 32VDC	0453.010	0.0058	26.46	X X

1. Cold resistance measured at less than 10% of rated current at 23°C.
 2. Pt values stated for 8ms opening time.

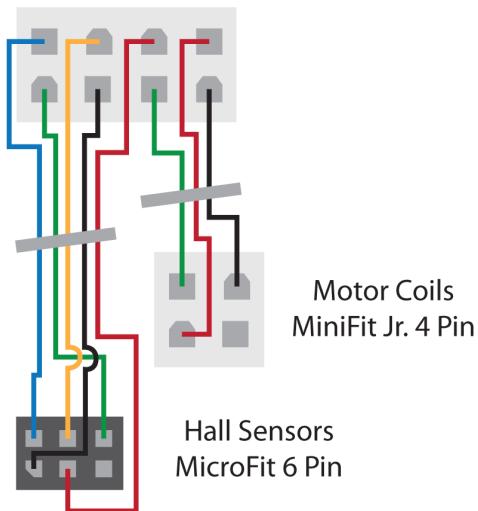
3. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved.

4. Have specific electrical characteristic needs? Contact Littlefuse to learn more about application specific options.

Drawing 450 - Cabling Diagrams

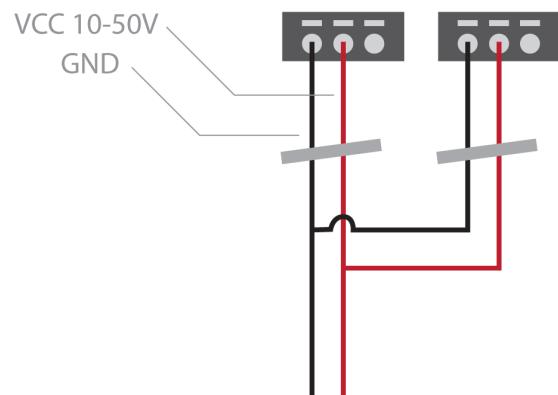
Looking at back of connectors

Motor
MiniFit Jr. 8 Pin



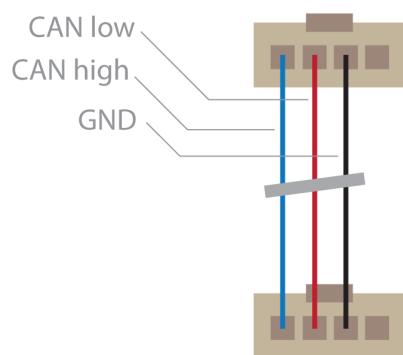
Motor Coils
MiniFit Jr. 4 Pin

Power
Included Spring Loaded

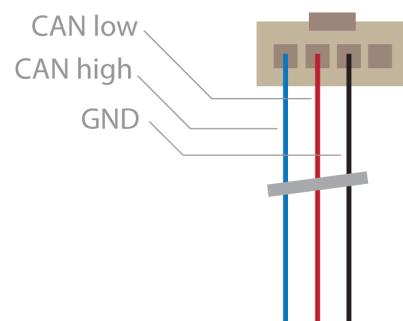


Hall Sensors
MicroFit 6 Pin

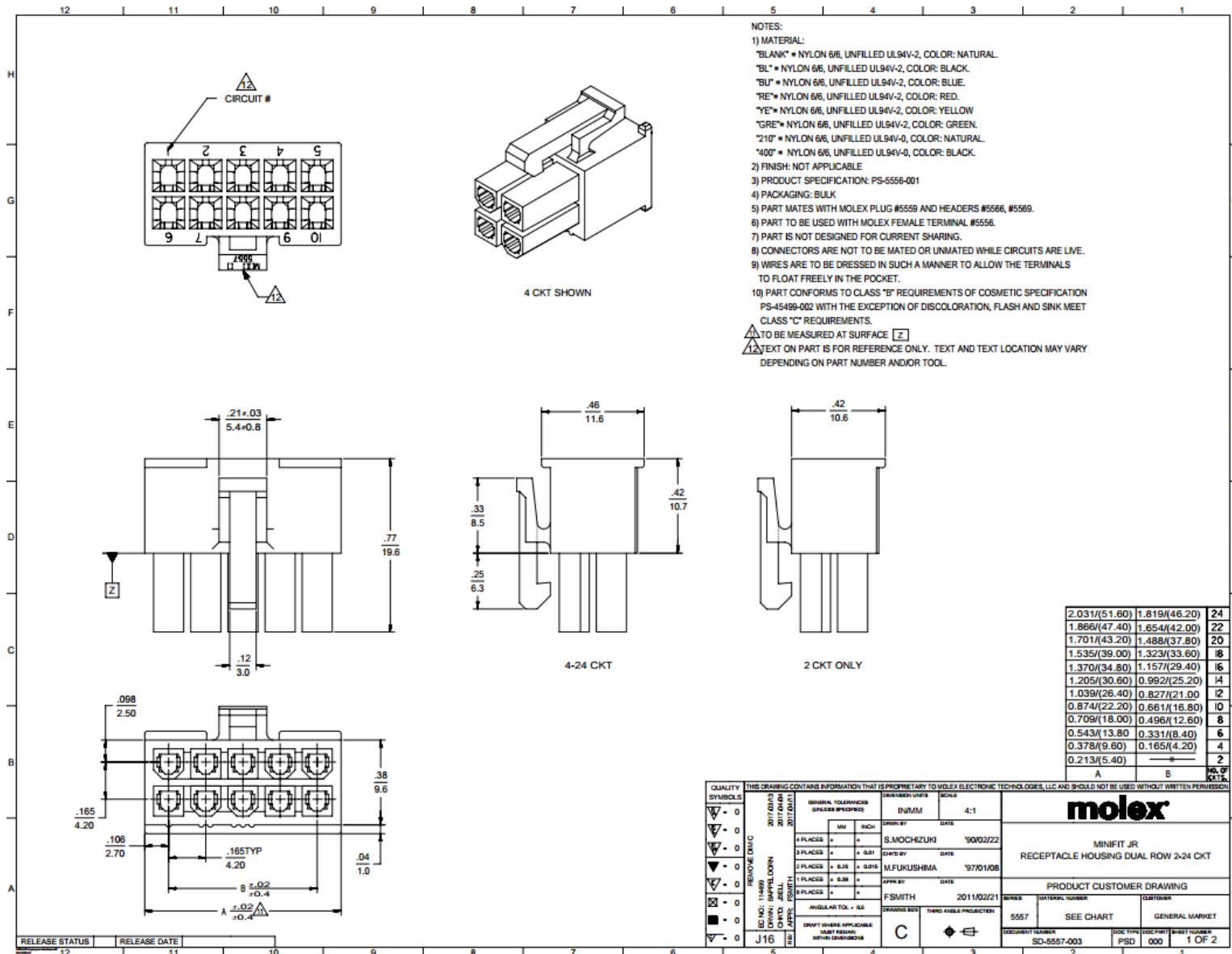
CAN
Clik-Mate 4 Pin



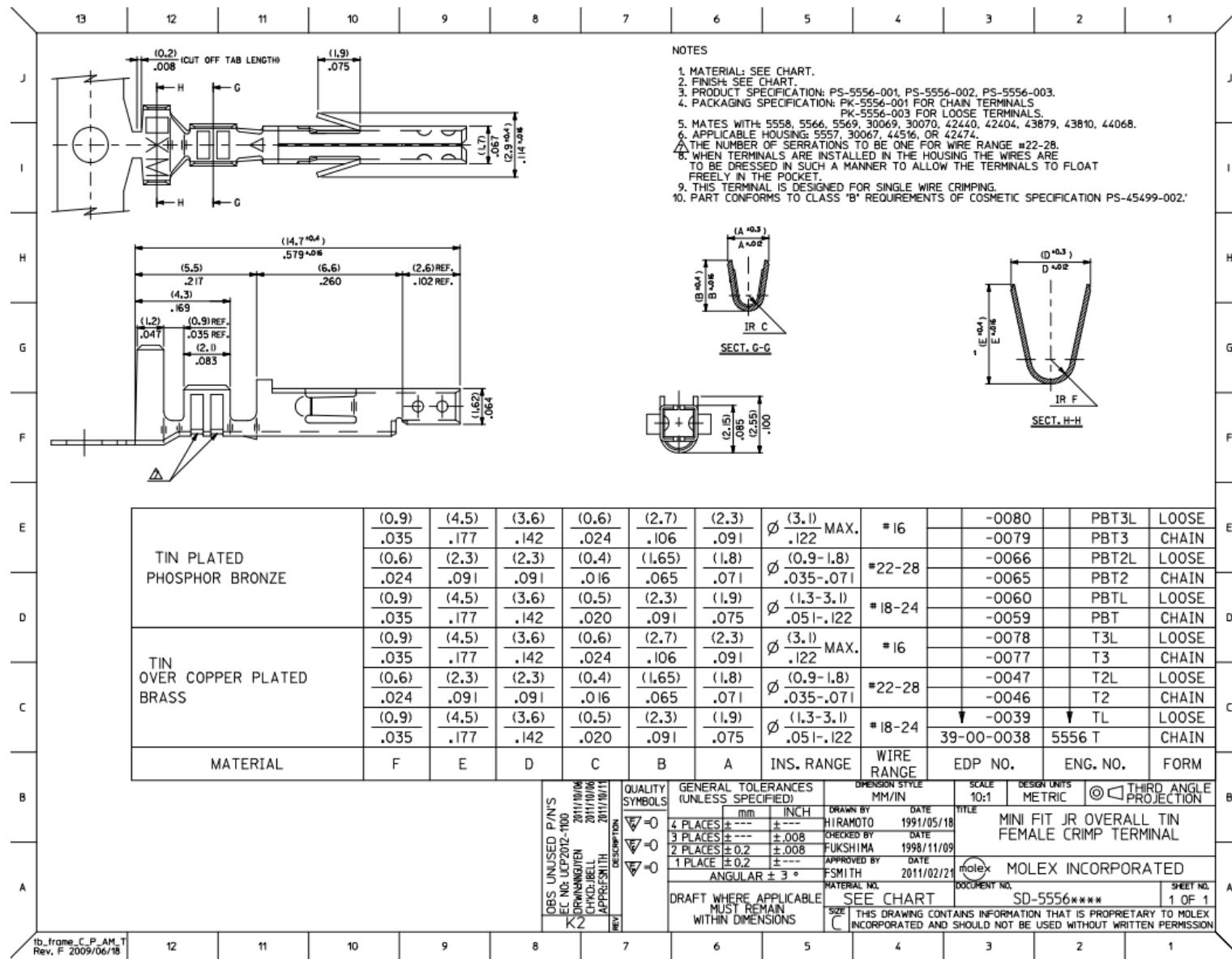
CAN
Clik-Mate 4 Pin



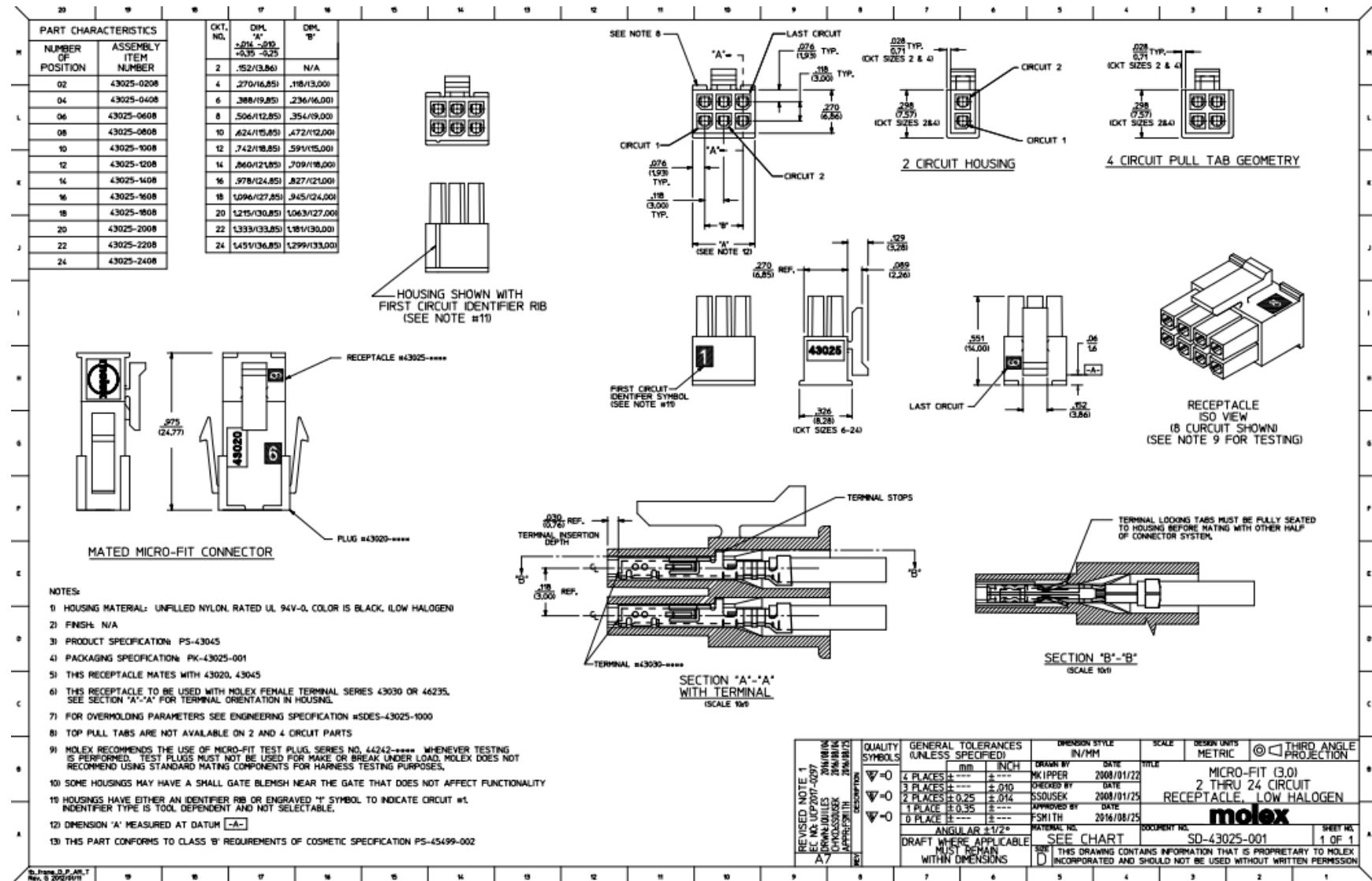
451 – Minifit Jr Receptacle



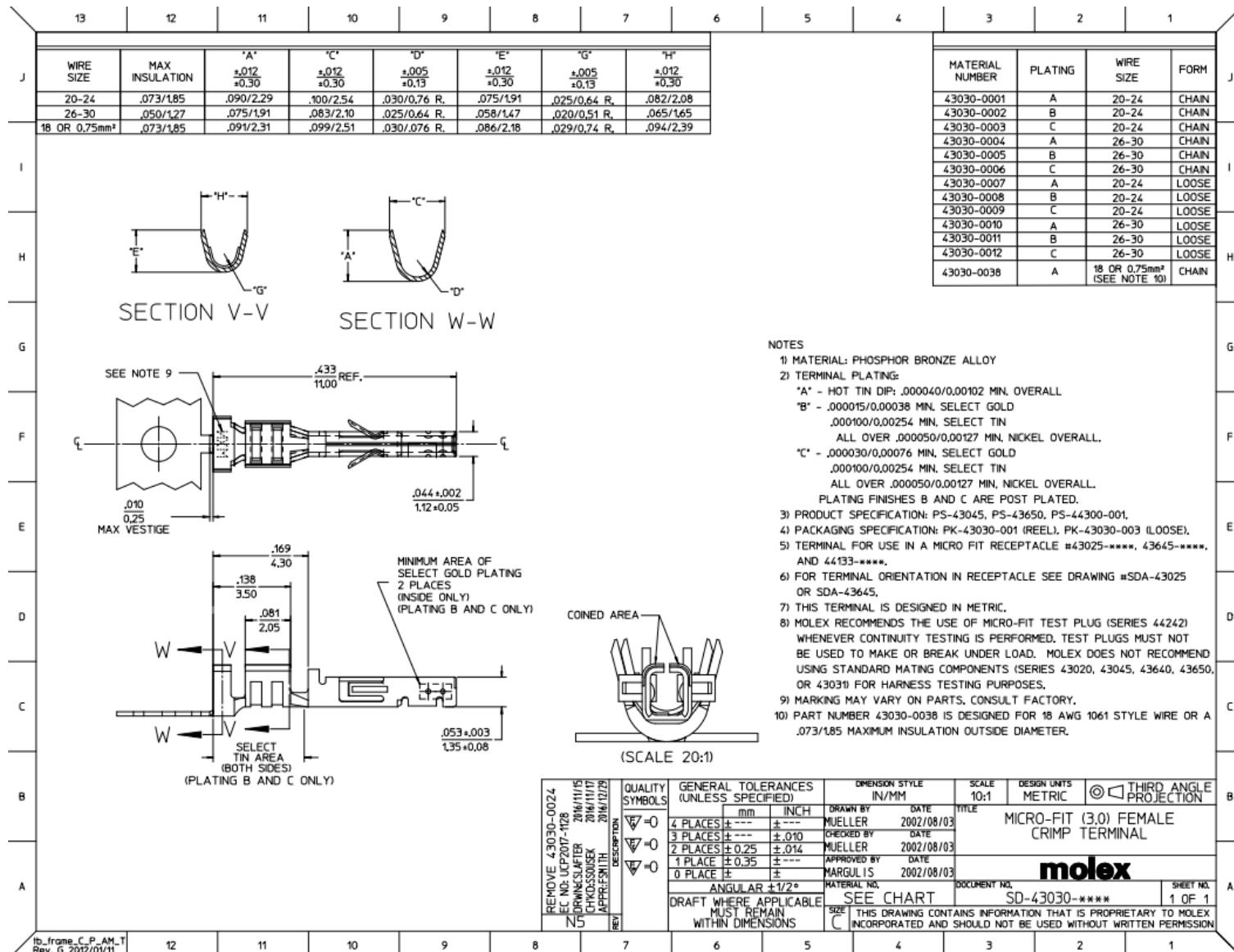
452 – Minifit Jr Crimp Receptacle



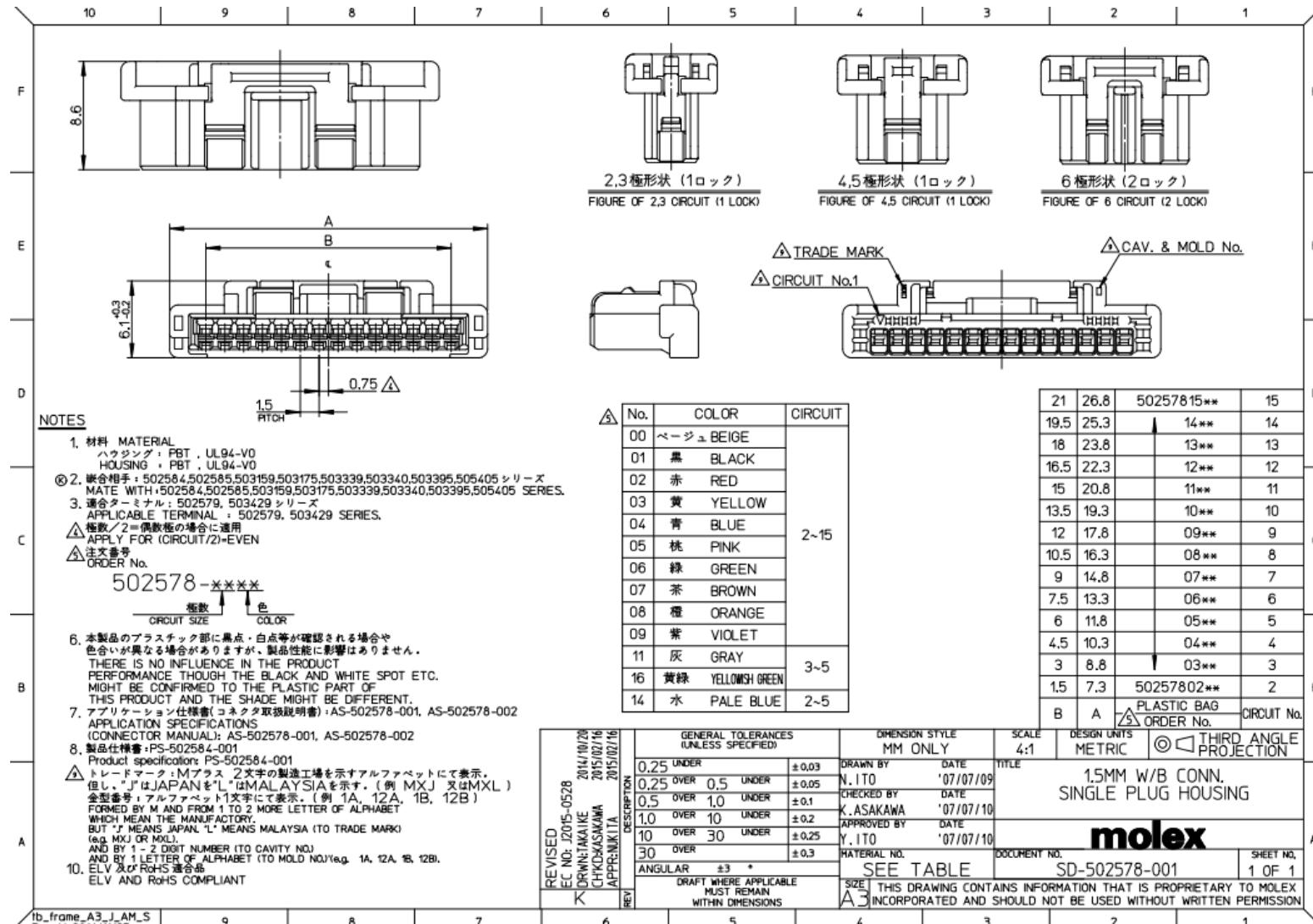
453 – Microfit 3.0 Receptacle



454 – Microfit 3.0 Crimp Receptacle



455 – Clik-Mate 1.5



456 – Clik-Mate Crimp Pin

