

## 686 Series Solenoid PRODUCT SPECIFICATION SHEET

### Product Facts

- Designed to be the smallest, lightest weight, lowest cost sealed contactor in the industry with its current rating (500+A carry, 2000A interrupt at 320VDC).
- Built-in coil economizer – only 1.7W hold power @ 12VDC and it limits back EMF to 0V. Models requiring external economizer also available.
- Optional auxiliary contact for easy monitoring of power contact position.
- Hermetically sealed – intrinsically safe, operates in explosive/harsh environments with no oxidation or contamination of coils or contacts, including long periods of nonoperation.
- Versatile coil/power connections.
- AIAG QS9000 designed, built and approved



Typical applications include battery switching and back-up, DC voltage power control, circuit protection and safety.

### Performance Data

Parameter	Units	Value for 686 Series
Contact Arrangement, power contacts		1 Form A (SPST-NO)
Rated Operating Voltage	VDC	12 - 96
Continuous (Carry) Current, Typical	A	500 @ 65C, 400 mcm conductors
Make/Break Current at Various Voltages <sup>1/</sup>	A	See next page
Break Current at 320VDC <sup>1/</sup>	A	2,000, 1 cycle <sup>2/</sup>
Contact Resistance, Typ. (@200A)	mohms	0.2
Load Life	Cycles	See next page
Mechanical Life	Cycles	100,000
Contact Arrangement, auxiliary contacts		1 Form A (SPST-NO)
Aux. Contact Current, Max.	A	2A @ 30VDC / 3A @ 125VAC
Aux. Contact Current, Min.	mA	100mA @ 8V
Aux. Contact Resistance, Max.	ohms	0.417@ 30VDC / .150 @ 125VAC
Operate Time @ 25C		
Close (includes bounce), Typ.	ms	40
Bounce (after close only), Max.	ms	7
Release (includes arcing), Max @ 2000A	ms	12
Dielectric Withstanding Voltage	Vrms	2,200 @ sea level (leakage <1mA)
Insulation Resistance @ 500VDC	megohms	100 <sup>2/</sup>
Shock, 11ms 1/2 sine, peak, operating	G	20
Vibration, sine, 80-2000Hz., peak	G	20
Operating Ambient Temperature	C	-40 to +65
Weight, Typical	lb.(kg)	1.3 (.60)

<sup>1/</sup> Main power contacts

<sup>2/</sup> 50 at end of life

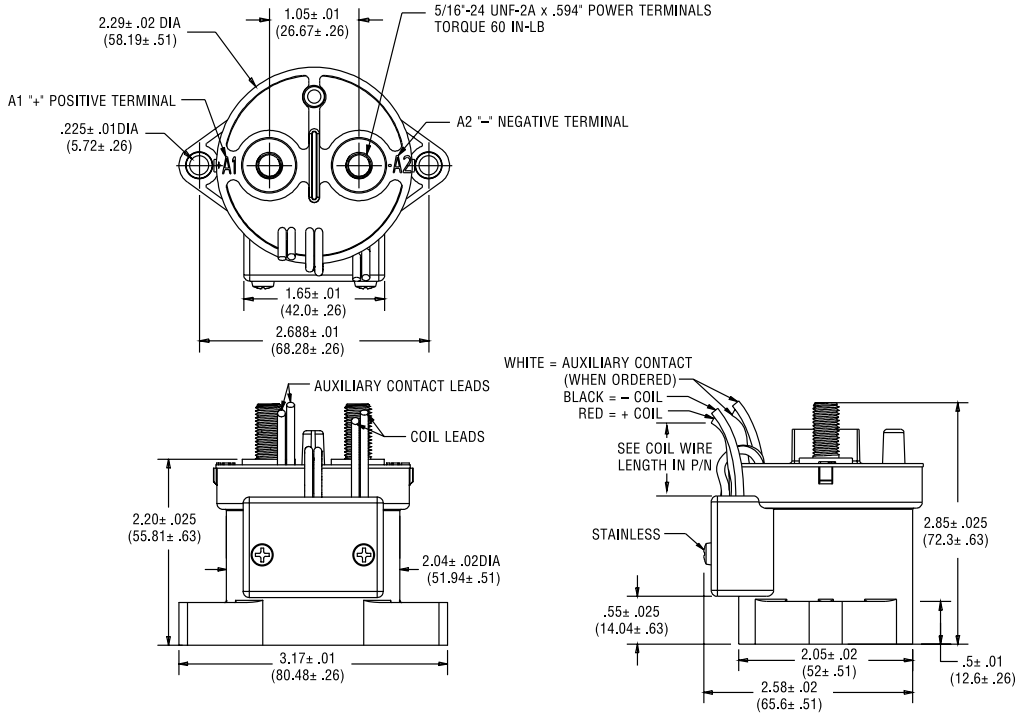
<sup>3/</sup> Does not meet dielectric & IR after test, 1700 amp for unit with Aux. Contacts

### Coil Operating Voltage (valid over temperature range)

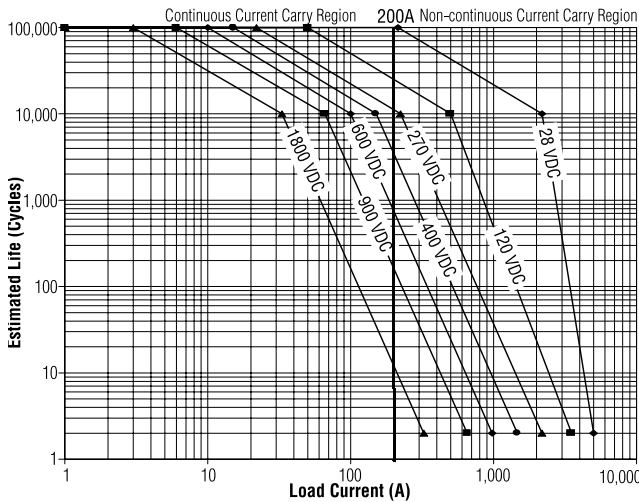
Nominal Voltage	12VDC	24VDC	48VDC
Voltage (will operate)	9.6-13.2VDC	19.2-26.9VDC	38.4-52.8VDC
Voltage (Max.)	13.2VDC	26.9VDC	52.8VDC
Pickup (close) Voltage Max.	9.6VDC	19.2VDC	38.4VDC
Holding Current (Avg.)	1.0A@12V	0.59A@24V	0.33A@48V

# 686 Series Solenoid (Continued)

## Outline Dimensions



## Estimated Make & Break Power Switching Ratings



### NOTES:

- 1) For resistive loads with 300 H maximum inductance
- 2) Estimates based on extrapolated data. User is encouraged to verify rating in actual application.
- 3) End of life when dielectric strength between terminals falls below 50 megohms @ 500VDC.
- 4) The maximum contact make and break power is estimated at 208KW. Break only above 208KW to avoid contact welding.

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

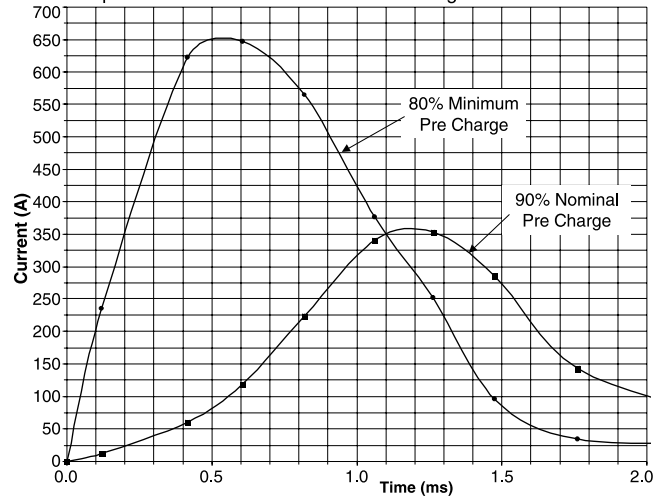
Dimensions are shown for reference purposes only. Specifications subject to change.

## Electrical Load Life Ratings for Typical 686 Applications

Make/Break Life Capacitive & Resistive Loads at 320VDC (1) (2)	
@90% capacitive pre-charge (make only) see chart below	Cycles 50,000
@80% capacitive pre-charge (make only) see chart below	Cycles 50
@200A make/break (2 consecutive, reverse polarity) (1)	Cycles 12
2,000A (break only) (1)	Cycles 1*
<b>Mechanical Life</b>	<b>Cycles 1 million</b>

- (1) Resistive load includes inductance L = 25μH. Load @ 2500A tested @ 200μH.  
 (2) Life based on projected Weibull Life with 95% reliability.  
 \* Does not meet dielectric and IR after test.

## 686 Capacitive Make Test Curves for Pre-Charged Motor Controller



**White**  
**Rodgers**

8100 W. FLOISSANT AVENUE  
 P.O. BOX 36922  
 ST. LOUIS, MO 63136  
 (314) 553-3600

# RELAYS AND CONTACTORS

## D.C. Power Contactors – Type 686

Type 686



Sec.	STANCOR PART NUMBER	Duty Cycle	Terminal Type*	Pole Form	Bracket Style	Coil Volt. D.C.	Coil Resistance (Ohms) @25°C	Contact Material	Contact Rating-(Amps.) Inductive Load			DIMENSIONS INCHES			Weight (oz.)	Agency Certif.		
									Volt. D.C.	Normally Open Continuous	Normally Closed Continuous	L	W	H				
A	686-901	Continuous	4	SPNO	Vertical	12-36	3.3	Copper	12-36	500	1200	-	-	3.17	2.58	2.85	15	-
	686-902	Continuous	4	SPNO	Vertical	48-96	3.3	Copper	48-96	500	1200	-	-	3.17	2.58	2.85	15	-

— Water Resistant

\* Terminal Type: "4" = Isolated Coil

\*\* Inrush Current: Current applied within the first 1/2 second of contact closure

For outline drawings refer to page 59.

### Engineering Design Data

D.C. Type	Coil Rating Nominal Magnetic Coil Rating (Watts)	Operation in % of Nom. Coil Voltage Rating		Breakdown Voltages * All Terminals - 60 Hz RMS			Contact Material		Electrical Life		Mechanical Life		Max. Oper. Temp. °F
		Pick-up	Max. Safe Operate	Opposite Polarity	Open Contacts Same Polarity	To Ground	Power	Pilot	Oper. At Rated Load	Oper. Per Min.	Oper. At No Load	Oper. Per Min.	
686	2.4	80	110	2200	2200	2200	Copper	-	100,000	2	100,000	6	149

\* Dielectric @ Sea Level

### Storage Temperature

— -40°F to 247°F

### Terminations

— Contacts: 5/16" - 24 UNF - 2A Thread

— Coil:

Leads: Black (-), Red (+)

Terminals: #10-32 stud coil terminals

### Recommended Mounting

— Available with bottom or side mounting. Not position sensitive.

### Hardware Torque Specification

— Contact Terminal: 45-60 in-lbs.

— Coil Terminal: 12-18 in-lbs.

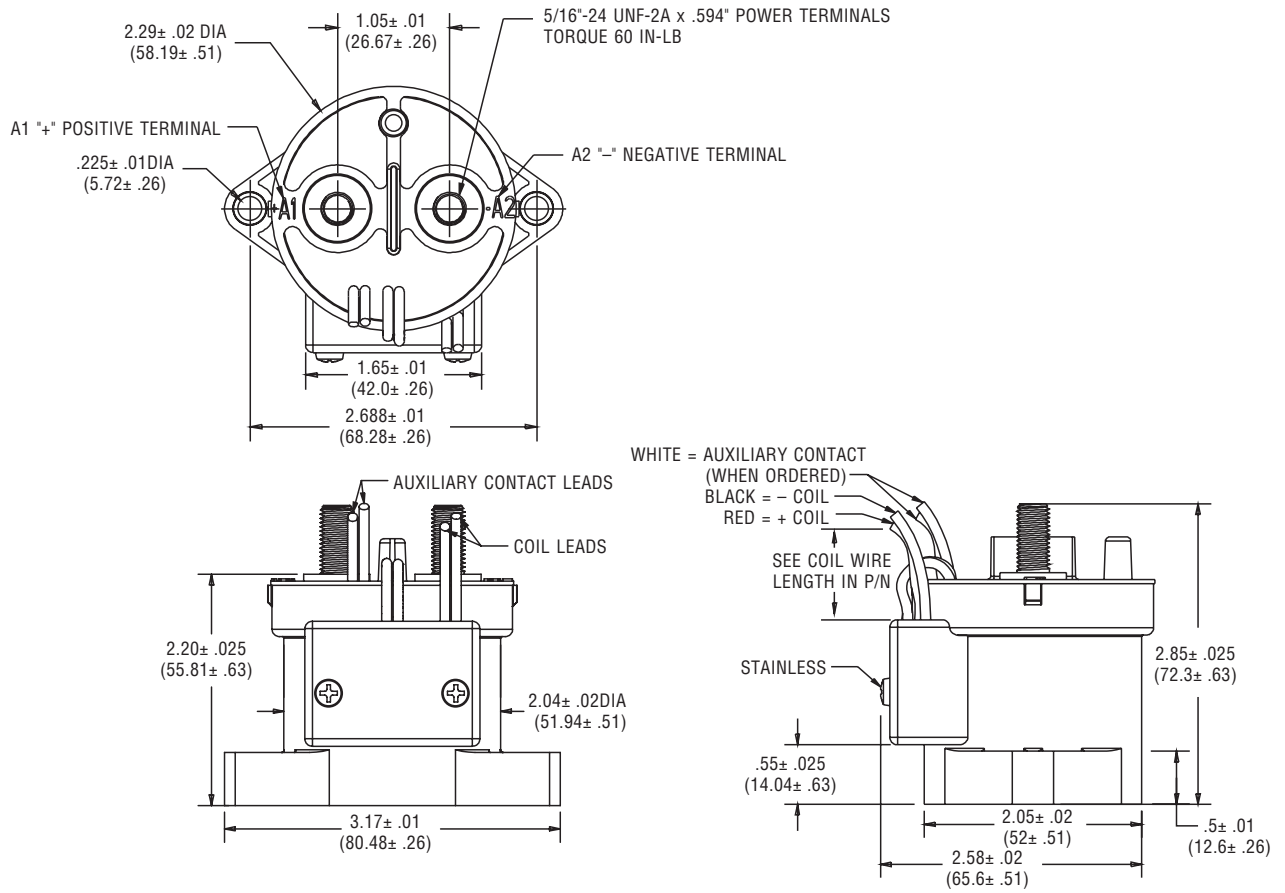
### Type 686 Custom Design Capabilities

— Coil voltages 12 VDC through 96 VDC

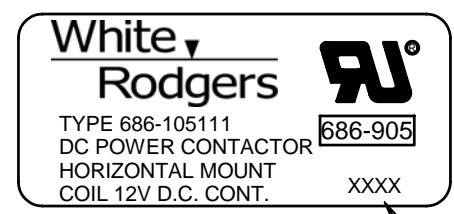
— Please complete application data form on page 95 of this section.

— **Type 686 RoHS Compliant**

Outline Dimensions

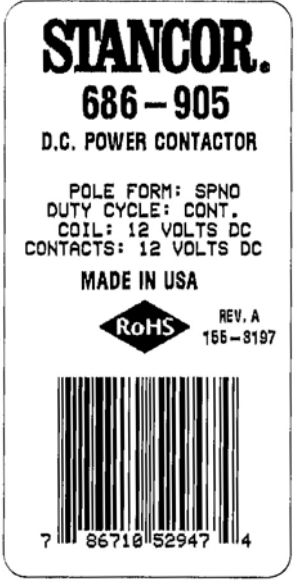


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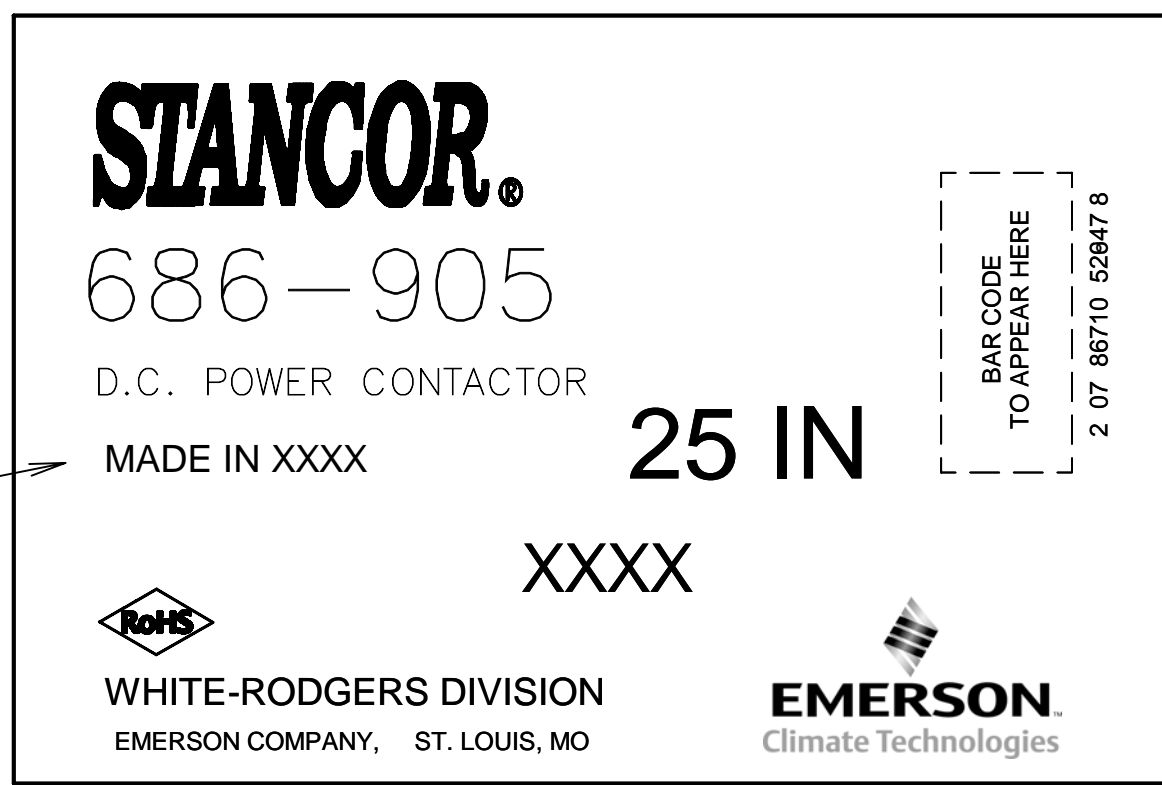


CONTROL LABEL

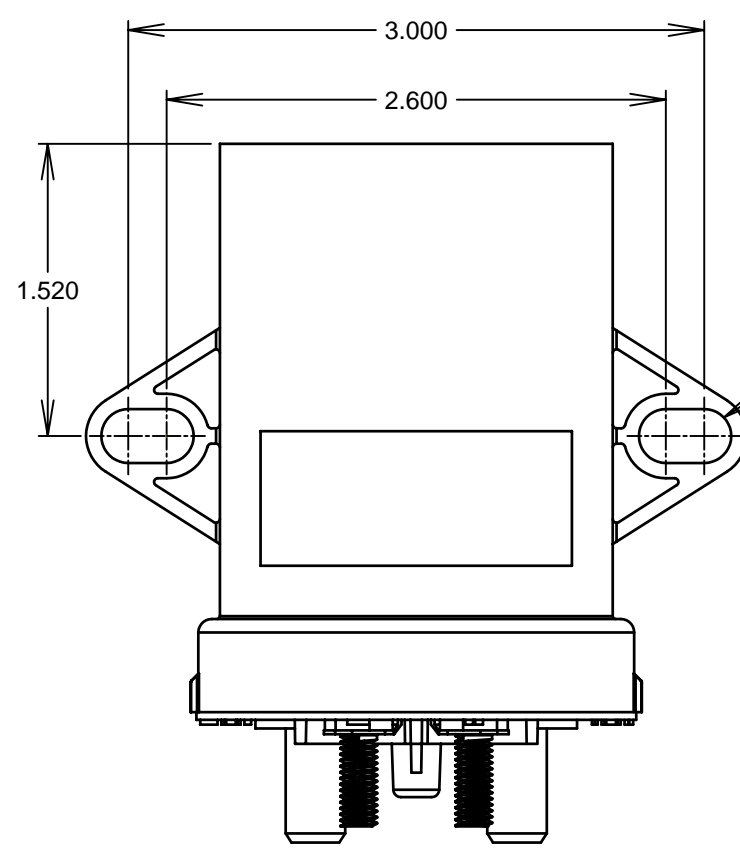
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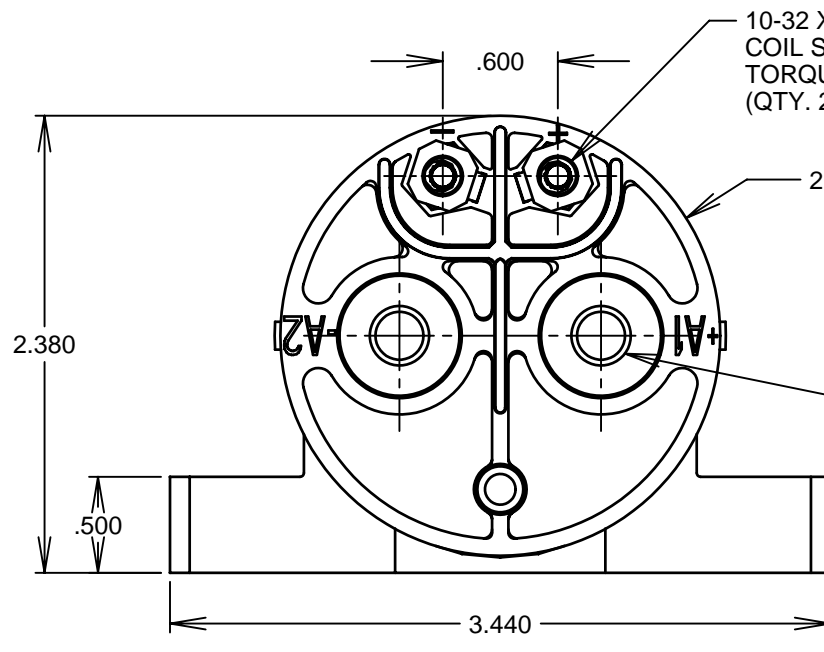
IND. CONTROL LABEL



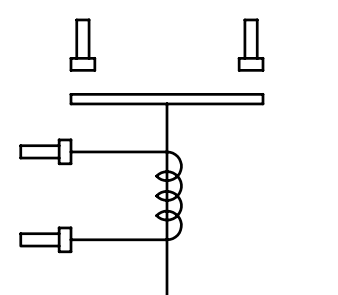
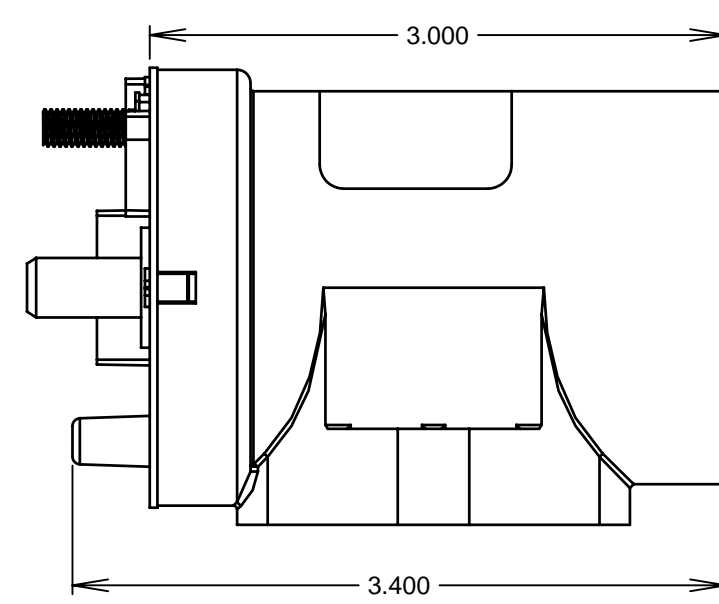
MASTER CARTON LABEL



.281 DIA. MOUNTING HARDWARE: 1/4-20 UNC BOLT (QTY. 2) LOCKWASHER (QTY. 2) WASHER (QTY. 2) TORQUE: 70 IN-LBS MAX.



NOTE: HARDWARE NOT INCLUDED



CIRCUIT DIAGRAM

							DO NOT SCALE DRAWING. WORK TO DIMENSIONS. IF PLATING IS SPECIFIED, ALL DIMENSIONS TO BE MET AFTER PLATING.		DESIGN	CTQ	CLASSIFICATION OF CHARACTERISTICS		
									★	★★	(CRITICAL)		
									◆	◆◆	(MAJOR)		
									C of C Review: JH Date: 4-16-07				
							159828	C	REVISED CONTROL LABEL & IND.CONTROL LABEL	09-03-07	SA	SIMILAR TO:	SUPERSEDING:
							158521	B	"COUNTRY OF ORIGIN" ADDED TO MASTER CARTON LABEL	4-16-07	EK	PROJ. NO.:	PART NO. WAS:
							157067	A	RELEASED	11-6-06	RH	MADE FOR (ORIG. USAGE):	SCALE: NONE
							ECN NO.	LETTER	REVISION RECORD	DATE	BY	CHECKED BY: ROGER HARDIEWAY	DATE: 11-6-06
							MATERIAL (ALL MATERIALS AND PROCESSES MUST BE COMPLIANT WITH RoHS AND JIG LEVEL 'A'):						
							FINISH:						
ECN NO.	LETTER	REVISION RECORD				DATE	BY	TITLE: CUSTOMER CONTROL DRAWING FOR 686-905		PART NO.: 1000-1230			

