



ACCEPTANCE TEST DATA

Date	Job Number	SKU No.	Frequency	Output Power
August 4, 2022	17110-1-1	2236-001	2800-3500	120kW-Peak

Power Amplifier Final Test

ELECTRICAL SPECIFICATIONS @ 208V_{AC} 3-Phase, 25°C ambient, 50Ω System

Parameter	Specifications					Frequency (MHz)										P/F										
	Symbol	Min	Typ	Max	Unit	Notes	2800	2900	3000	3100	3200	3300	3400	3500												
Operating Frequency - BW	BW	2800		3500	MHz		√	√	√	√	√	√	√	√							P					
Power Gain @ P _{OUT} =120kWpk 500μS pulse width; 10% (δ) duty cycle	G	71	76		dB	Record	84	85	78.6	78.8	75.2	73.8	73.6	77.2							P					
Sample Port @ 120kWpk 500μS pulse width; 10% (δ) duty cycle	P _{sample}		10		dBm	Record	9.2	9.5	9.8	10.46	10	10.3	9.3	9.8							P					
Min. P _{in} for P _{OUT} = 120kWpk (80.8dBm) (500μS PW, DC = 10% (δ), MGC and Gated Input)	P _{in}	0	9.5	dBm	Record	-3.2	-4.2	2.2	2	5.6	7	7.2	3.6								P					
Min. P _{in} for P _{OUT} = 100kWpk (80dBm) (1ms PW, DC = 10% (δ), MGC and Gated Input)						-3.6	-5.2	0.8	1.4	3.6	5.8	6	2.4												P	
Min. P _{in} for P _{OUT} = 70kWpk (78.45dBm) (2ms PW, DC = 10% (δ), MGC and Gated Input)						-5.4	-6.6	-1	-0.6	1.2	3.4	3.4	-0.2													P
Min. P _{in} for P _{OUT} = 40kWpk (76.02dBm) (3ms PW, DC = 10% (δ), MGC and Gated Input)						-8.2	-8.8	-3.8	-3.2	-1.6	0.4	0.4	-3.4													P
Min. P _{in} for P _{OUT} = 20kWpk (73dBm) (4ms PW, DC = 10% (δ), MGC and Gated Input)													-7.4													P
Min. P _{in} for P _{OUT} = 10kWpk (70dBm) (5ms PW, DC = 10% or CW, MGC and Gated Input)									-9.8												P					
Droop @ 120kWpk, 500μS PW, DC = 10% (δ) (MGC and Gated Input)	P _{Droop}		2.0	dB	Plot 5 & 9	1.5	1	1	0.75	1.2	0.83	1.3	1.3								P					
Droop @ 70kWpk, 2mS PW, DC = 10% (MGC and Gated Input)						0.97	0.92	0.83	0.74	0.85	0.85	1.4	1.37											P		
Pulse Characteristics, P _{OUT} = 120kW (500μS PW, DC = 10% (δ), MGC and Gated Input)	T _{RISE}			70	nSec	Plots 6 & 7	12	14	13	14	13	13	12	13							P					
	T _{FALL}			70			16	16	16	15	16	15	16	15	15								P			
Pulse Characteristics, P _{OUT} = 70kW (2mS PW, DC = 10% (δ), MGC and Gated Input)	T _{RISE}			70			Plot 10 & 11	18	16	14	15	13	11	12	18								P			
	T _{FALL}			70				15	16	15	15	16	16	15	15	15								P		
Input Return Loss	S11			-10	dB	Plot 1	-	-	-	-	-	-	-	-							P					
Small Gain Flatness	ΔG			±5	dB	Plot 1	-	-	-	-	-	-	-	-							P					
Gain @ Shutdown Condition, P _{IN} = 0dBm (f)	G _{SD}			35	dB	Plot 3	-	-	-	-	-	-	-	-							P					
Gain Adjustment Range (500μS PW, DC = 10% (δ), MGC and Gated Input)	VVA	20			dB	Plot 2	-	-	-	-	-	-	-	-							P					
Spurious Signals	Spur			-60	dBc	Record	<-70	<-70	<-70	<-70	<-70	<-70	<-70	<-70							P					
Noise Power Output (NPO)	Enabled			-10	dBm/MHz	Record	-14.3															P				
	Disabled			-100	dBm/MHz	Record	>-103															P (Σ)				
Harmonics @ nominal Pout: (500μS PW, DC = 10% (δ), MGC and Gated Input)	2 nd			20	dBc	Record	-51	-42	-53	-52	-57	-57	-51	-70							P					
	3 rd			25	dBc	Record	-63	-57	-72	-62	-66	-65	-61	-63								P				

† Gain @ Cold Stand-By Condition ≤ 35dB (P_{IN} = 0dBm)

Σ Spectrum Analyzer noise floor -103.3dBm/MHz

§ Output load limitation prevents 20% testing at factory

ACCEPTANCE TEST DATA

ELECTRICAL SPECIFICATIONS (cont.) @ 208V_{AC} 3-Phase, 25°C ambient, 50Ω System

Parameter	Specifications						Frequency (MHz)								P/F								
	Symbol	Min	Typ	Max	Unit	Notes	2800	2900	3000	3100	3200	3300	3400	3500									
Operating Voltage	V _{dc}	180	208	260	V	Record	201	201	201	201	201	201	201	201							P		
Power Consumption @ P _{OUT} = 120kW (500µs PW, DC=10%(s), MGC and Gated Input)	P _D			100	kVA	Record	41.171	38.181	37.763	39.641	41.589	41.241	42.979	44.162							P		
Power Consumption @ POUT = 70kW (2ms PW, DC=10%, MGC and Gated Input)				80			34.634	31.157	30.253	30.670	31.991	31.435	32.756	33.243									P
Power Consumption @ POUT = 50kW (3ms PW, DC=10%, MGC and Gated Input)				40			27.818	26.427	32.408	25.802	27.304	26.914	27.957	27.999									P
Power Consumption @ POUT = 10kW (5ms PW, DC=10%, or CW MGC and Gated Input)				110			0.635	0.635	0.635	14.952	0.635	0.635	0.635	0.635									P
Power Consumption @ Shutdown	P _{SD}			10	kVA	Record	8.104															P	
Quiescent Power Consumption	P _{DQ}			12	kVA	Record	9.356																P
Cooling Distribution Unit Power Consumption	P _D			6	kVA	Record	5.757																P
NTE Test, P _{IN} = +0dBm, LCD Display = 81dBm	P _{OOD}			82	dBm	Record P _{OUT}	82.0	81.9	81.7	81.2	81.1	81.0	81.0	80.9							P		
						dBm	Record P _{in}	-1.10	-2.30	4.20	4.00	7.50	8.60	8.90	5.50							P	
Input Overdrive - Shutdown	P _{IOD}			10	dBm	Verify	√	√	√	√	√	√	√	√							P		
VSWR - Backoff	VSWR		3:01		-	Verify	√	√	√	√	√	√	√	√							P		
Excess Duty Cycle Protection -- 500µs pulse width, 20% duty cycle				22	%	Verify	√	√	√	√	√	√	√	√							P		
Thermal Overload - Shutdown (stage3 -booster)	T _{OD}			95	°C	Verify	√	√	√	√	√	√	√	√							P		

INTERFACE

System Controller	Control Unit SW	Booster SW/FW	NTE	MGC Default Point	Set	Max Pulse width / Duty		Interlock	Summary Fault	Shutdown	RS232 Console	GPIO
	Build / Bundle ID	Build / Bundle ID	dBm	0% Min	100% Max	PW	DC	Verify	Verify	Verify	Verify	Verify
Verify / Record	361/3478	344/3473	81	√	-	520	21%	√	√	√	√	√

ACCEPTANCE TEST DATA

Performance Plots

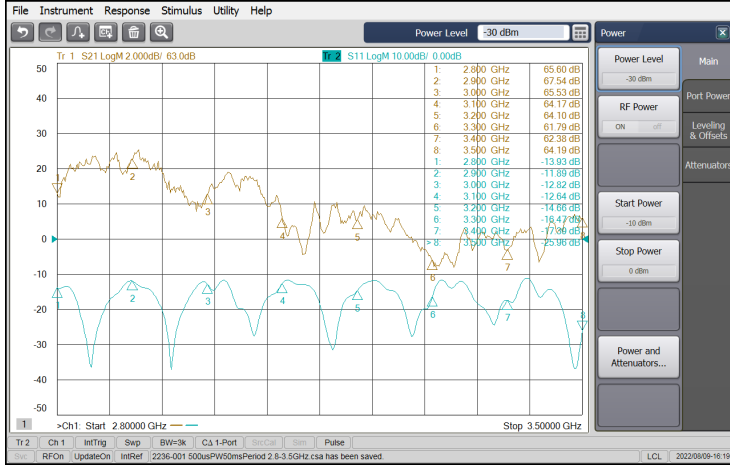
Plot 1 - Small Signal Gain and Input Return Loss (Peak)

Top Curve: Small Signal Gain @ $P_{IN} = -30\text{dBm}$

Reference: 63dB, 2dB/div.

Bottom Curve: Input Return Loss

Reference: 0dB, 10dB/div.



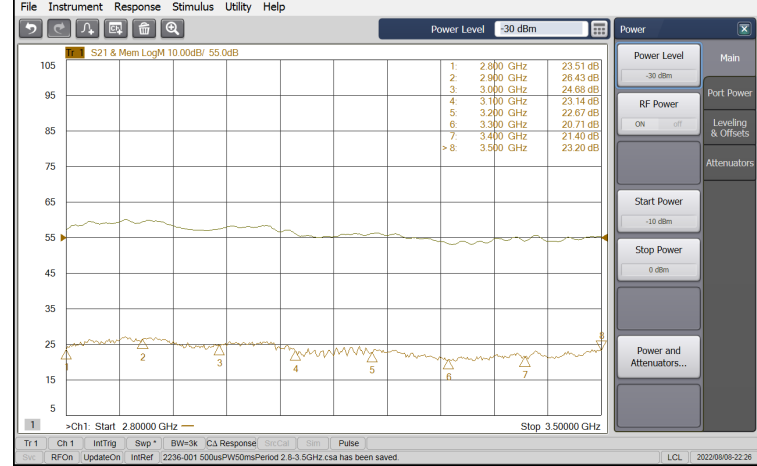
Plot 2 - Gain adjustment range

Top Curve (Trace Memory): Maximum Gain (MGC Mode and $P_{IN} = -30\text{dBm}$)

Reference: 55dB, 10dB/div.

Bottom Curve (Active Trace): Minimum Gain (MGC Mode and $P_{IN} = -30\text{dBm}$)

Reference: 55dB, 10dB/div.



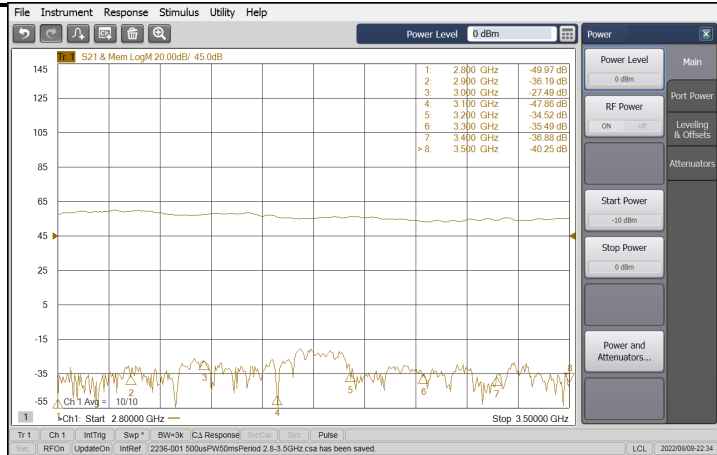
Plot 3 - Gain at shutdown condition

Top Curve (Trace Memory): Maximum Gain (MGC Mode and $P_{IN} = -30\text{dBm}$)

Reference: 45dB, 20dB/div.

Bottom Curve (Active Trace): Gain at Shutdown (MGC Mode and $P_{IN} = 0\text{dBm}$)

Reference: 45dB, 20dB/div.



Plot 4 - (N/A)

Top Curve (Trace Memory):

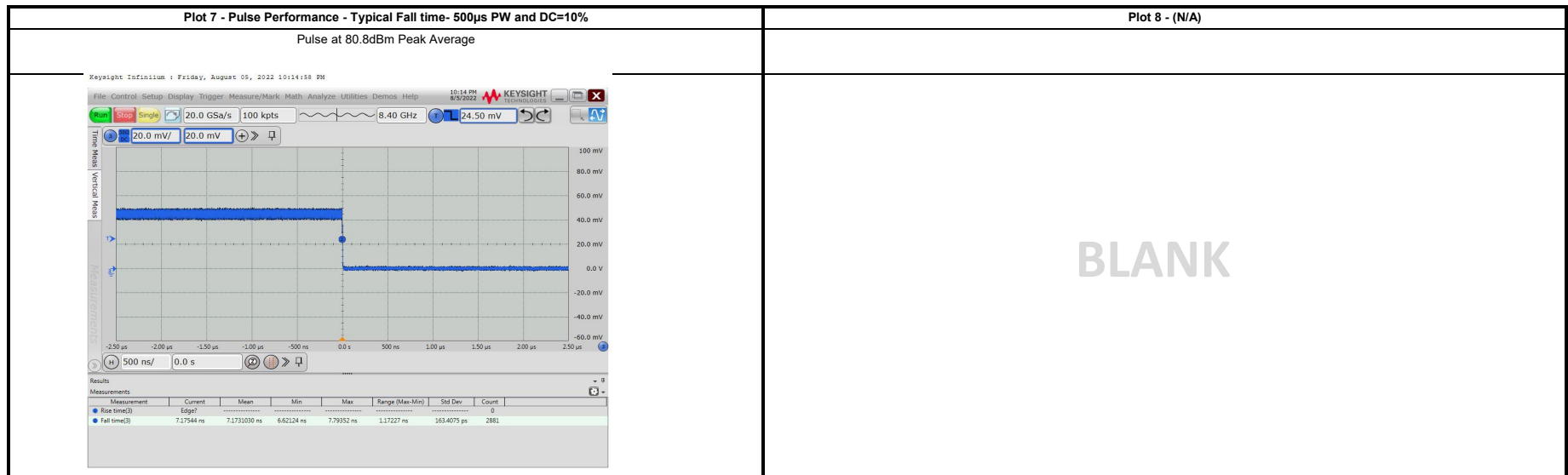
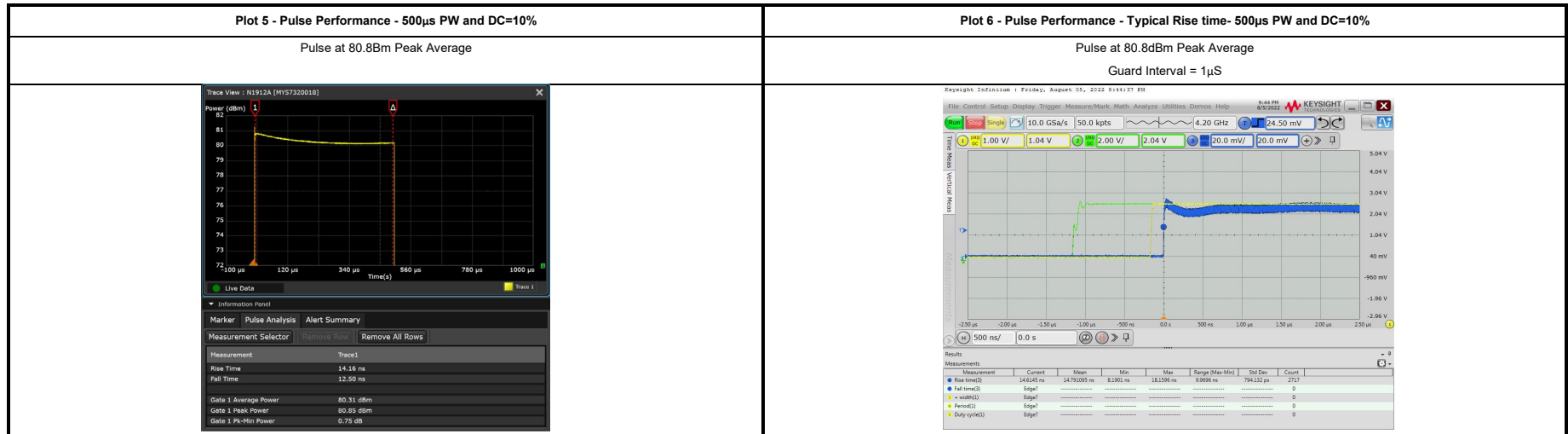
Reference: 80dB, 10dB/div.

Bottom Curve (Active Trace):

Reference: 80dB, 10dB/div.

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Performance Plots



Performance Plots

Plot 9 - Pulse Performance - 2ms PW and DC=10%

Pulse at 78.45dBm Peak Average



Plot 10 - Pulse Performance - Typical Rise time-2ms PW and DC=10%

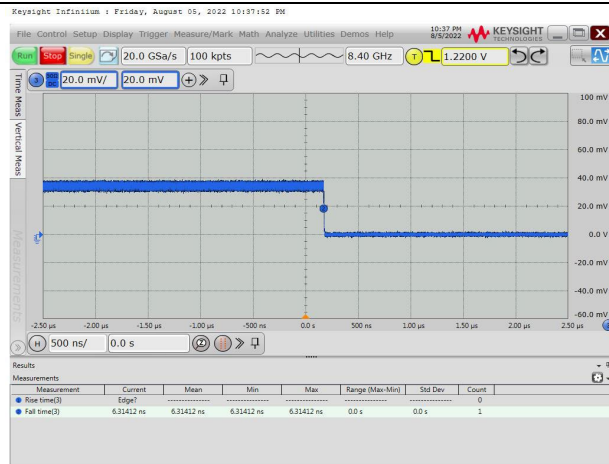
Pulse at 78.45dBm Peak Average

Guard Interval = 1μs



Plot 11 - Pulse Performance - Typical Fall time-2ms PW and DC=10%

Pulse at 78.45dBm Peak Average



Plot 12 - (N/A)

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Performance Plots

Plot 13 - Pulse Performance - 2µs PW and DC=1%

Pulse at 80.8dBm Peak Average



Plot 14 - Pulse Performance - Typical Rise time-2µs PW and DC=1%

Pulse at 80.8dBm Peak Average

Guard Interval = 1µS



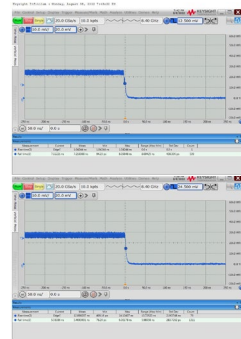
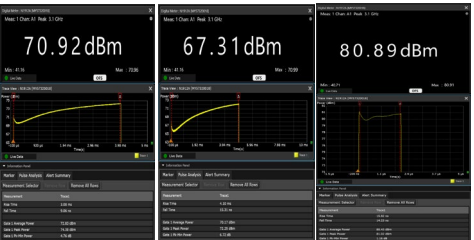
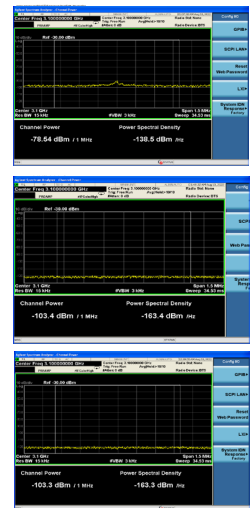
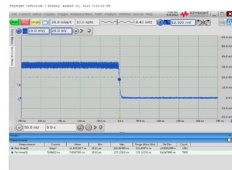
Plot 15 - Pulse Performance - Typical Fall time- 2µs PW and DC=1%

Pulse at 80.8dBm Peak Average



Plot 16 - (N/A)

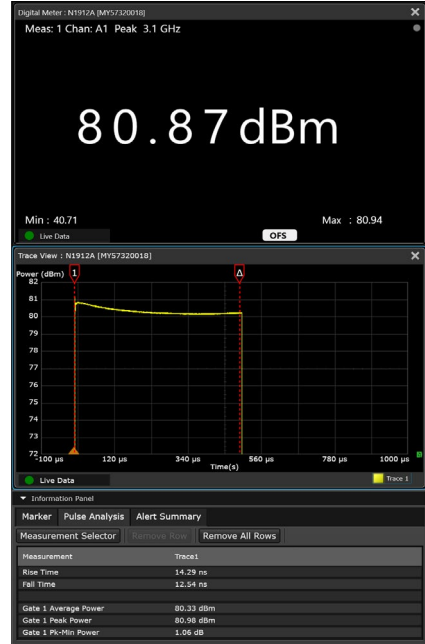
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burn-in

start Friday 8-5-22 at 9:30PM

COMMAND		RACK 1				RACK 2				PEAK	RMS	
STATUS	1	-3.62	ON	64.40	●	-2.37	ON	65.02	●	Input	2.02	-0.14
AMPLIFIERS	2	-1.87	ON	63.46	●	-2.59	ON	65.30	●	Forward	80.97	70.31
ENVIRONMENTAL	3	-3.54	ON	65.54	●	-1.59	ON	63.78	●	Reverse	59.34	48.50
CDU	4	-3.52	ON	64.58	●	-3.46	ON	65.73	●	Unbal	58.46	53.01
SYSTEM	5	-1.47	ON	64.47	●	-2.55	ON	66.68	●			
CONFIGURATION	6	-2.85	ON	66.14	●	-1.79	ON	65.67	●			
	7	-3.28	ON	64.82	●	-2.52	ON	64.34	●			
	8	-3.22	ON	65.38	●	-2.13	ON	65.22	●			
	9	-3.29	ON	63.41	●	-2.00	ON	65.54	●			
	10	-1.69	ON	62.25	●	-0.54	ON	64.65	●			
	11	-2.74	ON	65.36	●	-2.45	ON	64.78	●			
	12	-2.61	ON	66.90	●	-2.82	ON	64.46	●			
	13	-2.34	ON	64.26	●	-1.06	ON	64.19	●			
	14	-3.52	ON	64.16	●	-2.55	ON	66.57	●			
	15	-3.03	ON	66.32	●	-4.08	ON	65.69	●			
	16	-1.88	ON	65.45	●	-1.42	ON	66.47	●			
		IN	RF	FWD	FLT	IN	RF	FWD	FLT			
ROLE	RACK / SLOT	MAINT MODE				RFS / BUNDLE				OPER MODE		
FACTORY	0 / 0	INACTIVE				361 / 3478				SOS_CONTROLLER		



stop Monday 8-8-22 at 2:15PM

COMMAND		RACK 1				RACK 2				PEAK	RMS	
STATUS	1	-3.72	ON	64.45	●	-2.60	ON	65.26	●	Input	1.98	12.06
AMPLIFIERS	2	-2.16	ON	64.24	●	-2.70	ON	65.39	●	Forward	80.85	70.09
ENVIRONMENTAL	3	-3.66	ON	65.42	●	-1.67	ON	64.03	●	Reverse	58.69	47.16
CDU	4	-3.74	ON	64.78	●	-3.50	ON	65.93	●	Unbal	57.98	-70.00
SYSTEM	5	-1.64	ON	64.66	●	-2.72	ON	66.79	●			
CONFIGURATION	6	-3.14	ON	66.26	●	-1.80	ON	65.18	●			
	7	-3.40	ON	64.62	●	-2.70	ON	64.54	●			
	8	-3.46	ON	65.56	●	-2.23	ON	65.26	●			
	9	-3.42	ON	63.48	●	-2.09	ON	65.77	●			
	10	-1.94	ON	65.15	●	-3.29	ON	65.12	●			
	11	-2.72	ON	65.62	●	-2.45	ON	65.03	●			
	12	-2.71	ON	67.06	●	-2.90	ON	64.38	●			
	13	-2.60	ON	64.25	●	-1.22	ON	64.22	●			
	14	-3.09	ON	63.59	●	-2.64	ON	66.78	●			
	15	-3.20	ON	66.56	●	-4.10	ON	65.90	●			
	16	-1.74	ON	65.69	●	-1.66	ON	66.55	●			
		IN	RF	FWD	FLT	IN	RF	FWD	FLT			
ROLE	RACK / SLOT	MAINT MODE				RFS / BUNDLE				OPER MODE		
FACTORY	0 / 0	INACTIVE				361 / 3478				SOS_CONTROLLER		

