

SUMMARY

Circuit name	Total buses	Total elements		
ieee_13bus	14	42		
Total load P (kW)	Total load Q (kVAR)	Total delivered P (kW)	Total delivered Q (kVAR)	
3403.8	2064.3	3516.9	1763.0	
Total P losses (kW)	Losses (%)	Total demanded Q (kVAR)		
113.1	3.3	390.7		



BUSES

Name	Node	Phase V (kV)	Base kV	V pu	Sources		Loads		Connected elements
					kW	kVAr	kW	kVAr	
BUS_611	1	2.368 \angle 113.8°	2.402	0.986	0	0	164.4	79.62	LINE.LINE_684611 LOAD.LOAD 611-LOAD_611
				Total:	0	0	164.4	79.62	
BUS_632	1	2.385 \angle -2.8°	2.402	0.993	0	0	104.8	61.22	LINE.LINE_632633 LINE.LINE_632645
	2	2.51 \angle -121.9°		1.045	0	0	0	0	LINE.LINE_650632 LINE.LINE_632671
	3	2.444 \angle 116.7°		1.017	0	0	0	0	LOAD.DIST LOAD 632-LOAD_D671B
	V12:	4.222 \angle61.5°		Total:	0	0	104.8	61.22	LOAD.DIST LOAD 632-LOAD_D671A
									LOAD.DIST LOAD 632-LOAD_D671C
BUS_633	1	2.378 \angle -2.8°	2.402	0.99	0	0	0	0	LINE.LINE_632633 TRANSFORMER.XFM1-1
	2	2.505 \angle -122.0°		1.043	0	0	0	0	
	3	2.438 \angle 116.7°		1.015	0	0	0	0	
	V12:	4.211 \angle61.5°	Total:		0	0	0	0	
BUS_634	1	0.268 \angle -3.5°	0.277	0.967	0	0	393.8	287.6	TRANSFORMER.XFM1-1 LOAD.LOAD 634-LOAD_634C
	2	0.284 \angle -122.4°		1.024	0	0	0	0	
	3	0.276 \angle 116.2°		0.996	0	0	0	0	
	V12:	0.475 \angle62.0°	Total:		0	0	393.8	287.6	
BUS_645	1	2.487 \angle -122.1°	2.402	1.035	0	0	183.3	132.7	LINE.LINE_645646 LINE.LINE_632645
	2	2.439 \angle 116.7°		1.016	0	0	0	0	
	V12:	4.292 \angle-177.0°	Total:		0	0	183.3	132.7	LOAD.LOAD 645-LOAD_645
BUS_646	1	2.483 \angle -122.2°	2.402	1.034	0	0	81.48	137.4	LINE.LINE_645646 LOAD.LOAD 646-LOAD_646
	2	2.434 \angle 116.8°		1.014	0	0	0	0	
	V12:	4.281 \angle-177.0°	Total:		0	0	81.48	137.4	
BUS_650	1	2.402 \angle -0.0°	2.402	1.0	-1177.7	-650.5	0	0	VSOURCE.V1 TRANSFORMER.REGA
	2	2.402 \angle -120.0°		1.0	-1037.7	-407.2	0	0	TRANSFORMER.REGC TRANSFORMER.REGB
	3	2.401 \angle 120.0°		1.0	-1301.5	-705.3	0	0	
	V12:	4.16 \angle60.0°	Total:		-3516.9	-1763.0	0	0	
BUS_652	1	2.255 \angle -5.7°	2.402	0.939	0	0	112.8	75.8	LINE.LINE_684652 LOAD.LOAD 652-LOAD_652
				Total:	0	0	112.8	75.8	



Name	Node	Phase V (kV)	Base kV	V pu	Sources		Loads		Connected elements
					kW	kVAr	kW	kVAr	
BUS_671	1	2.272 \angle -5.7°	2.402	0.946	0	0	490.4	711.6	LINE.SWITCH LINE.LINE_671680
	2	2.531 \angle -122.6°		1.054	0	0	0	0	LINE.LINE_671684 LINE.LINE_632671
	3	2.378 \angle 114.0°		0.99	0	0	0	0	LOAD.LOAD 671-LOAD_671A
	V12:	4.094 \angle62.3°		Total:	0	0	490.4	711.6	LOAD.LOAD 671-LOAD_671C
									LOAD.LOAD 671-LOAD_671B
									LOAD.DIST LOAD 671-LOAD_D671A
									LOAD.DIST LOAD 671-LOAD_D671B
									LOAD.DIST LOAD 671-LOAD_D671C
BUS_675	1	2.257 \angle -6.0°	2.402	0.94	0	0	787.8	441.6	LINE.LINE_692675 LOAD.LOAD 675-LOAD_675C
	2	2.536 \angle -122.8°		1.056	0	0	0	0	LOAD.LOAD 675-LOAD_675B
	3	2.373 \angle 114.0°		0.988	0	0	0	0	LOAD.LOAD 675-LOAD_675A
	V12:	4.085 \angle62.3°	Total:	0	0	0	787.8	441.6	
BUS_680	1	2.272 \angle -5.7°	2.402	0.946	0	0	0	0	LINE.LINE_671680
	2	2.531 \angle -122.6°		1.054	0	0	0	0	
	3	2.378 \angle 114.0°		0.99	0	0	0	0	
	V12:	4.094 \angle62.3°	Total:	0	0	0	0	0	
BUS_684	1	2.267 \angle -5.7°	2.402	0.944	0	0	0	0	LINE.LINE_684611 LINE.LINE_684652
	2	2.373 \angle 113.9°		0.988	0	0	0	0	LINE.LINE_671684
	V12:	4.012 \angle126.7°	Total:	0	0	0	0	0	
BUS_692	1	2.272 \angle -5.7°	2.402	0.946	0	0	36.49	114.3	LINE.SWITCH LINE.LINE_692675
	2	2.531 \angle -122.6°		1.054	0	0	0	0	LOAD.LOAD 692-LOAD_692
	3	2.377 \angle 114.0°		0.99	0	0	0	0	
	V12:	4.094 \angle62.3°	Total:	0	0	0	36.49	114.3	
BUS_REG	1	2.538 \angle -0.4°	2.402	1.057	0	0	0	0	TRANSFORMER.REGA TRANSFORMER.REGC
	2	2.539 \angle -120.1°		1.057	0	0	0	0	LINE.LINE_650632 TRANSFORMER.REGB
	3	2.536 \angle 119.9°		1.056	0	0	0	0	
	V12:	4.39 \angle60.2°	Total:	0	0	0	0	0	



VSOURCES

Name	Bus	Node	Phase V (kV)	Base kV	V pu	V drop	kW	kVAr
V1	BUS_650	1	2.402 \angle -0.0°	2.402	1.0	0.01 %	-1177.7	-650.5
		2	2.402 \angle -120.0°	2.402	1.0	-0.02 %	-1037.7	-407.2
		3	2.401 \angle 120.0°	2.402	1.0	0.02 %	-1301.5	-705.3
		V12:	4.16 \angle60.0°			Total:	-3516.9	-1763.0



LINES

Name	Bus	Node	Phase V (kV)	Current (A)	Rating (A)	kW	kVAr	kW Loss	kVA Loss	V drop
LINE_632645	BUS_632	1	2.51 \angle -121.9°	149.4 \angle -143.2°		349.2	136.4	2.981	2.589	0.9 %
		2	2.444 \angle 116.7°	65.606 \angle 57.4°		81.97	137.8			0.2 %
		V12:	4.32 \angle -177.0°	Total:	431.2	274.2				

	BUS_645	1	2.487 \angle -122.1°	149.4 \angle 36.8°		-346.4	-134.0			
		2	2.439 \angle 116.7°	65.606 \angle -122.6°		-81.8	-137.6			
		V12:	4.292 \angle -177.0°	Total:	-428.2	-271.6				
LINE_671680	BUS_671	1	2.272 \angle -5.7°	0.003 \angle 90.3°		-0.0	-0.01	0.0	0.024	0.0 %
		2	2.531 \angle -122.6°	0.003 \angle -40.7°		0.0	-0.01			0.0 %
		3	2.378 \angle 114.0°	0.003 \angle -152.7°		-0.0	-0.01			0.0 %
		V12:	4.094 \angle 62.25°	Total:	0.0	-0.024				

	BUS_680	1	2.272 \angle -5.7°	0.0 \angle -153.4°		-0.0	0.0			
		2	2.531 \angle -122.6°	0.0 \angle 56.3°		-0.0	-0.0			
		3	2.378 \angle 114.0°	0.0 \angle 0.0°		-0.0	0.0			
		V12:	4.094 \angle 62.25°	Total:	-0.0	0.0				
LINE_684652	BUS_684	1	2.267 \angle -5.7°	60.257 \angle -39.5°		113.5	76.01	0.739	0.212	0.6 %
		Total:	113.5	76.012						

	BUS_652	1	2.255 \angle -5.7°	60.274 \angle 140.4°		-112.8	-75.8			
Total:	-112.8	-75.8								
LINE_632633	BUS_632	1	2.385 \angle -2.8°	78.178 \angle -38.4°		151.6	108.6	0.773	1.006	0.3 %
		2	2.51 \angle -121.9°	63.952 \angle -159.3°		127.5	97.48			0.2 %
		3	2.444 \angle 116.7°	62.225 \angle 79.3°		120.9	92.25			0.2 %
		V12:	4.222 \angle 61.47°	Total:	400.0	298.4				

	BUS_633	1	2.378 \angle -2.8°	78.179 \angle 141.6°		-151.2	-108.1			
		2	2.505 \angle -122.0°	63.953 \angle 20.7°		-127.4	-97.2			
		3	2.438 \angle 116.7°	62.226 \angle -100.7°		-120.6	-92.0			
		V12:	4.211 \angle 61.51°	Total:	-399.2	-297.3				



Name	Bus	Node	Phase V (kV)	Current (A)	Rating (A)	kW	kVAr	kW Loss	kVA Loss	V drop
LINE_692675	BUS_692	1	2.272 ∠-5.7°	189.6 ∠-4.9°		430.6	-5.81	3.564	2.167	0.6 %
		2	2.531 ∠-122.6°	68.447 ∠-58.7°		76.12	-155.6			0.2 %
		3	2.377 ∠114.0°	119.8 ∠111.9°		284.6	10.37			0.2 %
		V12:	4.094 ∠62.25°		Total:	791.3	-151.0			

	BUS_675	1	2.257 ∠-6.0°	189.6 ∠175.1°		-427.9	7.55			
		2	2.536 ∠-122.8°	68.427 ∠121.3°		-75.8	156.1			
		3	2.373 ∠114.0°	119.8 ∠-68.1°		-284.0	-10.4			
		V12:	4.085 ∠62.31°		Total:	-787.8	153.21			
LINE_650632	BUS_REG	1	2.538 ∠-0.4°	527.2 ∠-28.9°		1175.3	639.7	58.186	219.1	6.0 %
		2	2.539 ∠-120.1°	437.5 ∠-141.3°		1035.8	401.2			1.1 %
		3	2.536 ∠119.9°	581.5 ∠91.7°		1299.4	697.8			3.7 %
		V12:	4.39 ∠60.22°		Total:	3510.5	1738.7			

	BUS_632	1	2.385 ∠-2.8°	527.2 ∠151.1°		-1128.4	-554.8			
		2	2.51 ∠-121.9°	437.5 ∠38.7°		-1036.2	-363.8			
		3	2.444 ∠116.7°	581.49 ∠-88.3°		-1287.7	-601.0			
		V12:	4.222 ∠61.47°		Total:	-3452.4	-1519.6			
SWITCH	BUS_671	1	2.272 ∠-5.7°	211.1 ∠-18.8°		467.2	108.6	0.079	0.079	0.0 %
		2	2.531 ∠-122.6°	68.447 ∠-58.7°		76.12	-155.6			0.0 %
		3	2.378 ∠114.0°	172.1 ∠108.9°		407.4	36.58			0.0 %
		V12:	4.094 ∠62.25°		Total:	950.8	-10.44			

	BUS_692	1	2.272 ∠-5.7°	211.1 ∠161.2°		-467.1	-108.5			
		2	2.531 ∠-122.6°	68.447 ∠121.3°		-76.1	155.6			
		3	2.377 ∠114.0°	172.1 ∠-71.1°		-407.4	-36.6			
		V12:	4.094 ∠62.25°		Total:	-950.7	10.519			
LINE_645646	BUS_645	1	2.487 ∠-122.1°	65.607 ∠-122.6°		163.2	1.35	0.545	0.431	0.2 %
		2	2.439 ∠116.7°	65.606 ∠57.4°		81.76	137.6			0.2 %
		V12:	4.292 ∠-177.0°		Total:	244.9	138.9			

	BUS_646	1	2.483 ∠-122.2°	65.607 ∠57.4°		-162.9	-1.14			
		2	2.434 ∠116.8°	65.607 ∠-122.6°		-81.5	-137.4			
		V12:	4.281 ∠-177.0°		Total:	-244.4	-138.5			
LINE_632671	BUS_632	1	2.385 ∠-2.8°	446.2 ∠-27.2°		968.5	441.2	33.565	130.3	4.7 %
		2	2.51 ∠-121.9°	213.0 ∠-133.7°		523.3	109.4			0.8 %
		3	2.444 ∠116.7°	441.1 ∠98.6°		1024.6	335.2			2.7 %
		V12:	4.222 ∠61.47°		Total:	2516.4	885.8			

	BUS_671	1	2.272 ∠-5.7°	446.2 ∠152.8°		-943.0	-372.1			
		2	2.531 ∠-122.6°	213.0 ∠46.3°		-528.9	-104.1			
		3	2.378 ∠114.0°	441.1 ∠-81.4°		-1011.0	-279.4			
		V12:	4.094 ∠62.25°		Total:	-2482.9	-755.5			



Name	Bus	Node	Phase V (kV)	Current (A)	Rating (A)	kW	kVAr	kW Loss	kVA Loss	V drop
LINE_684611	BUS_684	1	2.373 \angle 113.9°	69.816 \angle 119.9°		164.8	-17.2	0.366	0.37	0.2 %
					Total:	164.8	-17.2			
	BUS_611	1	2.368 \angle 113.8°	69.816 \angle -60.1°		-164.4	17.6			
					Total:	-164.4	17.603			
LINE_671684	BUS_671	1	2.272 \angle -5.7°	60.257 \angle -39.5°		113.7	76.2	0.546	0.442	0.2 %
		2	2.378 \angle 114.0°	69.816 \angle 119.9°		165.1	-17.0			0.2 %
		V12:	4.022 \angle126.6°		Total:	278.8	59.221			
	BUS_684	1	2.267 \angle -5.7°	60.257 \angle 140.5°		-113.5	-76.0			
		2	2.373 \angle 113.9°	69.816 \angle -60.1°		-164.8	17.23			
		V12:	4.012 \angle126.7°		Total:	-278.3	-58.8			



LOADS

Name	Bus	Node	Phase V (kV)	kW	kVAr	kVA	PF	kVABase	pu kVA
LOAD 634-LOAD_634C	BUS_634	1	0.276 \angle 116.2°	119.1	89.33	148.9	0.8		
			Total:	119.1	89.329	148.9	0.8	150.0	0.99
LOAD 692-LOAD_692	BUS_692	1	2.272 \angle -5.7°	36.49	114.3	120.0	0.3		
			Total:	36.49	114.3	120.0	0.3	227.38	0.53
LOAD 671-LOAD_671B	BUS_671	1	2.531 \angle -122.6°	135.9	228.1	265.5	0.51		
			Total:	135.91	228.1	265.5	0.51	443.42	0.6
DIST L...71-LOAD_D671B	BUS_671	1	2.531 \angle -122.6°	36.78	20.84	42.28	0.87		
			Total:	36.781	20.844	42.28	0.87	38.08	1.11
LOAD 634-LOAD_634A	BUS_634	1	0.268 \angle -3.5°	148.9	103.9	181.6	0.82		
			Total:	148.88	103.9	181.6	0.82	194.16	0.94
DIST L...32-LOAD_D671B	BUS_632	1	2.51 \angle -121.9°	36.18	20.51	41.59	0.87		
			Total:	36.185	20.507	41.59	0.87	38.08	1.09
LOAD 671-LOAD_671C	BUS_671	1	2.378 \angle 114.0°	136.4	225.2	263.3	0.52		
			Total:	136.4	225.2	263.3	0.52	443.42	0.59
LOAD 611-LOAD_611	BUS_611	1	2.368 \angle 113.8°	164.4	79.62	182.7	0.9		
			Total:	164.4	79.623	182.7	0.9	187.88	0.97
LOAD 675-LOAD_675A	BUS_675	1	2.257 \angle -6.0°	427.9	169.1	460.1	0.93		
			Total:	427.9	169.1	460.1	0.93	520.89	0.88
DIST L...32-LOAD_D671A	BUS_632	1	2.385 \angle -2.8°	8.36	4.96	9.72	0.86		
			Total:	8.362	4.962	9.72	0.86	9.86	0.99
DIST L...71-LOAD_D671A	BUS_671	1	2.272 \angle -5.7°	8.82	0.0	8.82	1.0		
			Total:	8.822	0.0	8.82	1.0	9.86	0.89
DIST L...71-LOAD_D671C	BUS_671	1	2.378 \angle 114.0°	57.03	33.84	66.31	0.86		
			Total:	57.027	33.838	66.31	0.86	67.665	0.98
DIST L...32-LOAD_D671C	BUS_632	1	2.444 \angle 116.7°	60.25	35.75	70.05	0.86		
			Total:	60.245	35.748	70.05	0.86	67.665	1.04
LOAD 671-LOAD_671A	BUS_671	1	2.272 \angle -5.7°	115.5	203.6	234.1	0.49		
			Total:	115.52	203.6	234.1	0.49	443.42	0.53



Name	Bus	Node	Phase V (kV)	kW	kVAr	kVA	PF	kVABase	pu kVA
LOAD 645-LOAD_645	BUS_645	1	2.487 \angle -122.1°	183.3	132.7	226.3	0.81		
			Total:	183.3	132.7	226.3	0.81	211.01	1.07
LOAD 652-LOAD_652	BUS_652	1	2.255 \angle -5.7°	112.8	75.8	135.9	0.83		
			Total:	112.8	75.799	135.9	0.83	154.21	0.88
LOAD 675-LOAD_675C	BUS_675	1	2.373 \angle 114.0°	284.0	205.6	350.7	0.81		
			Total:	284.0	205.6	350.7	0.81	359.23	0.98
LOAD 675-LOAD_675B	BUS_675	1	2.536 \angle -122.8°	75.82	66.87	101.1	0.75		
			Total:	75.819	66.866	101.1	0.75	90.69	1.11
LOAD 634-LOAD_634B	BUS_634	1	0.284 \angle -122.4°	125.8	94.36	157.3	0.8		
			Total:	125.8	94.356	157.3	0.8	150.0	1.05
LOAD 646-LOAD_646	BUS_646	1	2.434 \angle 116.8°	81.48	137.4	159.7	0.51		
			Total:	81.483	137.4	159.7	0.51	265.19	0.6



TRANSFORMERS

Name	Wdg / Bus	Node	Phase V (kV)	kVA base	kW	kVA _r	kVA	PF	pu kVA	kW Loss	kVA Loss
REGA	1 / BUS_650	1	2.401 ∠120.0°	1666.7	278.7	-59.3	284.9	0.98		0.771	1.359
		2	2.402 ∠-120.0°		212.6	-134.1	251.4	0.85			
		3	2.401 ∠120.0°		278.7	-59.3	284.9	0.98			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	4.16 ∠0.0°		Total:	770.0	-252.7	810.4	0.95	0.49	
	2 / BUS_REG	1	2.536 ∠119.9°	1666.7	-278.4	59.79	284.8	0.98			
		2	2.539 ∠-120.1°		-212.3	134.5	251.4	0.84			
		3	2.536 ∠119.9°		-278.4	59.79	284.8	0.98			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	4.396 ∠0.1°		Total:	-769.2	254.1	810.1	0.95	0.49	
REGC	1 / BUS_650	1	2.402 ∠-0.0°	1666.7	1177.7	650.5	1345.4	0.88		4.842	21.745
		2	2.402 ∠-120.0°		399.9	809.6	903.0	0.44			
		3	2.401 ∠120.0°		465.5	883.2	998.4	0.47			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	4.16 ∠60.0°		Total:	2043.1	2343.3	3108.9	0.66	1.87	
	2 / BUS_REG	1	2.538 ∠-0.4°	1666.7	-1175.3	-639.7	1338.1	0.88			
		2	2.539 ∠-120.1°		-398.8	-804.7	898.1	0.44			
		3	2.536 ∠119.9°		-464.1	-877.2	992.4	0.47			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	4.39 ∠60.2°		Total:	-2038.2	-2321.6	3089.4	0.66	1.85	
XFM1-1	1 / BUS_633	1	2.378 ∠-2.8°	1666.7	151.2	108.1	185.9	0.81		5.408	9.743
		2	2.505 ∠-122.0°		127.4	97.19	160.2	0.8			
		3	2.438 ∠116.7°		120.6	92.01	151.7	0.8			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	4.211 ∠61.5°		Total:	399.2	297.3	497.8	0.8	0.3	
	2 / BUS_634	1	0.268 ∠-3.5°	1666.7	-148.9	-103.9	181.6	0.82			
		2	0.284 ∠-122.4°		-125.8	-94.4	157.3	0.8			
		3	0.276 ∠116.2°		-119.1	-89.3	148.9	0.8			
		N	0.0 ∠0.0°		0.0	0.0	0.0	0			
		V12:	0.475 ∠62.0°		Total:	-393.8	-287.6	487.6	0.81	0.29	



Name	Wdg / Bus	Node	Phase V (kV)	kVA base	kW	kVAr	kVA	PF	pu kVA	kW Loss	kVA Loss
REGB	1 / BUS_650	1	2.402 \angle -120.0°	1666.7	212.6	-134.1	251.4	0.85		0.749	1.251
		2	2.402 \angle -120.0°		212.6	-134.1	251.4	0.85			
		3	2.401 \angle 120.0°		278.7	-59.3	284.9	0.98			
		N	0.0 \angle 0.0°		0.0	0.0	0.0	0			
		V12:	0.0 \angle 0.0°	Total:	703.9	-327.6	776.4	0.91	0.47		

	2 / BUS_REG	1	2.539 \angle -120.1°	1666.7	-212.3	134.5	251.4	0.84			
		2	2.539 \angle -120.1°		-212.3	134.5	251.4	0.84			
		3	2.536 \angle 119.9°		-278.4	59.79	284.8	0.98			
		N	0.0 \angle 0.0°		0.0	0.0	0.0	0			
		V12:	0.0 \angle 0.0°	Total:	-703.1	328.8	776.2	0.91	0.47		

