1005W AC/DC Switching Power Supply
Model: TN21-1005-01



FEATURES

- Universal AC input range 90-264VAC.
- Operating temperature range: -20°C to +70°C.
- Built-in active PFC function.
- Built-in protections: OVP / OCP / SCP /OTP.
- High efficiency up to 91%.
- RPS redundancy design with active current sharing.
- Designed for IEEE 802.3af / IEEE 802.3at / IEEE 802.3bt applications.
- Tight voltage regulation for stable ethernet power delivery
- Operating altitude up to 5000m.
- Complies with IEC/EN/UL 62368-1 standard.

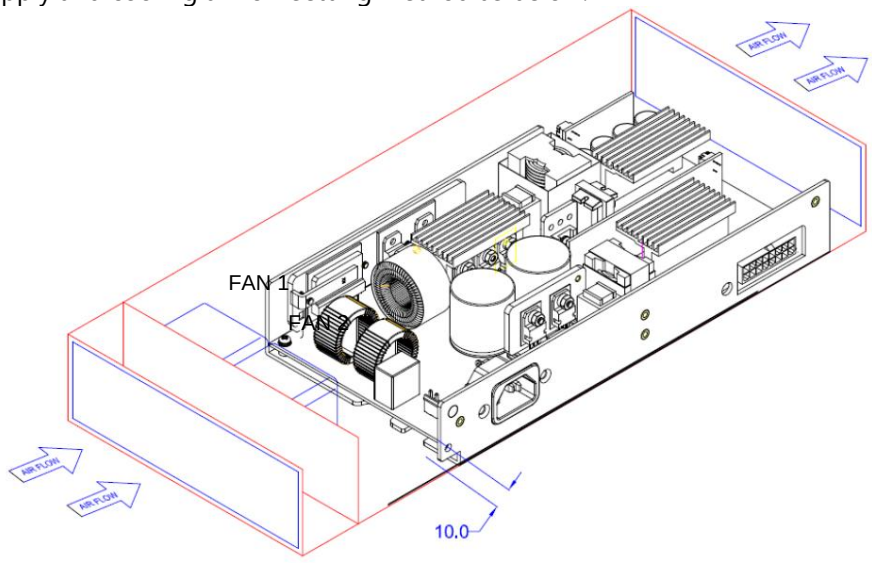
Models & Ratings

Model No.	Output Power	Cooling Method	Output 1 Voltage/ Current	Output 2 Voltage/ Current	Efficiency at 230VAC Typ.
TN21-1005-01	1005W	Forced Air Cooling	12.0V / 15.0A	-55.0V / 15.0A	91%

Cooling

The power supply have not fan, it is cooled by system fan (3 fans at front and 2 fans at back) with minimum 21 CFM airflow.

Recommended power supply and cooling airflow setting method as below:



Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	AC input		90	100 - 240	264	VAC
Input Frequency	-		47	50 - 60	63	Hz
Input Current	115VAC		-	-	12.0	Arms
	230VAC		-	-	5.5	
Inrush Current	115VAC	At 25°C, Cold start	-	-	30	A peak

	230VAC				60	
Power Factor	115VAC	At maximum load	0.98	-	-	-
	230VAC		0.95			
Touch Current	264VAC		-	-	1.5	mA

Output 1 Specifications

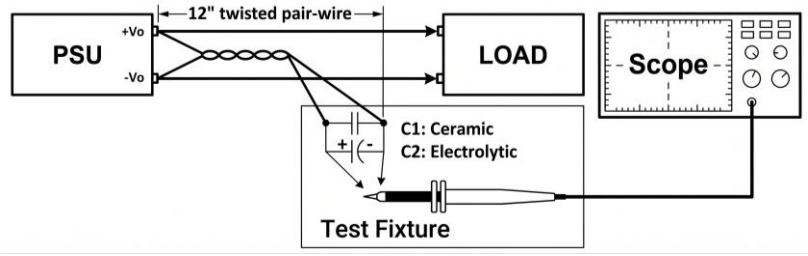
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Output from minimum to maximum load	11.4	12.0	12.6	VDC
Initial setting voltage	At output 2A	11.95	-	12.05	VDC
Output Current	Output range	0	-	15.0	A
Load Regulation	Output from minimum to maximum load	-	-	3	%
Ripple & Noise	20MHz bandwidth	-	-	1	%
Turn On Time	100VAC/60Hz rated load from input AC turn on	-	-	2	S
Hold Up Time	230VAC & maximum load, 90% of output voltage	20	-	-	mS
Short Circuit Protection	Output shut down and auto recovery (Hiccup 5s)	-	-	-	-
Over Current Protection	Output shut down and auto recovery (Hiccup 5s)	15.5	-	19.5	A
Over Voltage Protection	Output shut down and auto recovery (Hiccup 5s)	13.2	-	15.6	V

Output 2 Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Output from minimum to maximum load	-56.65	-55.0	-53.35	VDC
Initial setting voltage	At output 2A	-55.1	-55.0	-54.9	VDC
Output Current	Output range	0	-	15	A
Load Regulation	Output from minimum to maximum load	-	-	3	%
Ripple & Noise	20MHz bandwidth	-	-	1	%
Turn On Time	100VAC/60Hz rated load from input AC turn on	-	-	2	S
Hold Up Time	230VAC & maximum load, 90% of output voltage	16	-	-	mS
Short Circuit Protection	Output shut down and auto recovery (Hiccup 5s)	-	-	-	-
Over Current Protection	Output shut down and auto recovery (Hiccup 5s)	15.5	-	19.5	A
Over Voltage Protection	Output shut down and auto recovery (Hiccup 5s)	-71.5	-	-60	V

Ripple & Noise :

The +12V output is decoupled with 100μF low ESR aluminum electrolytic (C2) and 0.1μF ceramic capacitor (C1). Measurement is made with a high impedance probe connected across the decoupling capacitance. Measurements shall be made with an oscilloscope with 20MHz bandwidth.



The -54V noise is measured with a resistor load (not an electronic load). The output is decoupled with 470μF low ESR aluminum electrolytic and 0.1μF ceramic capacitor. See the table below for the output ripple and noise limits over frequency. Measurement is made with a high impedance probe connected across the decoupling capacitance. Measurement frequency range is 40Hz to 100MHz.

Frequency range	Ripple and noise limit

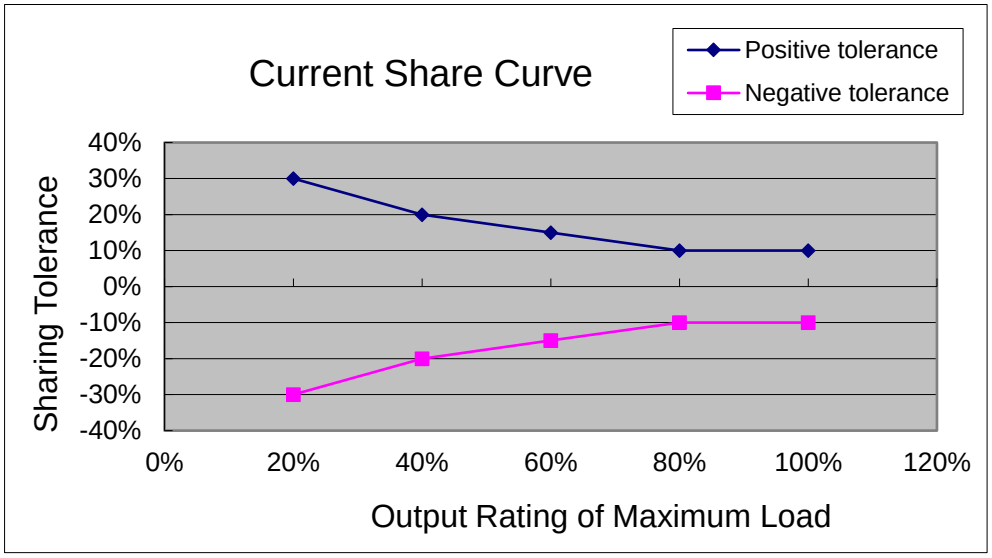
<500Hz	500mVpk-pk
500Hz-150KHz	200mVpk-pk
150KHz-500KHz	150mVpk-pk
500KHz-100MHz	100mVpk-pk

Turn On/Off Overshoot :
Overshoot at turn on shall be less than 10% of the nominal output voltage.

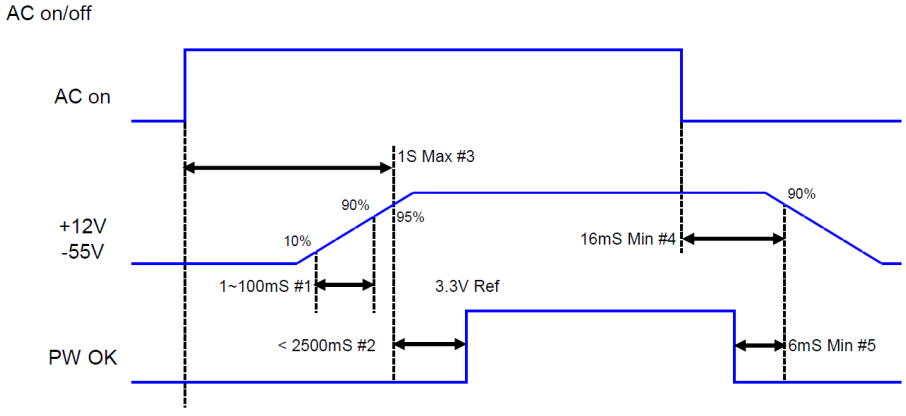
Dynamic Load :
The output voltages shall remain within limits specified for the step loading and capacitive loading specified in the test table below. The load transient repetition rate shall be tested between 100Hz and 5KHz frequency.

Output	△Step Load	Load Slew Rate	Capacitive Load
+12V	25% to 75%	1A/μs	3300μF
-55V	25% to 75%	1A/μs	1000μF

Current Share :
Current share is achieved by means of active current sharing. Provision is made for a current share line for +12V or -55V named +12VCS or -55VCS. +12VCS and -55VCS bus is independent. The current share line is referenced to the negative sense lead. The voltage on each of these lines is characterized in the table and graph below.
PSU built in ORing diode and current sharing for 1+1 redundant application. Two PSU must be same model of PSU and RPS connector connect current sharing function connector (18 pins) for 1+1 current sharing current sharing tolerance <10% at maximum current.



Sequencing :



#1: The +12V / -55V output voltages rise time from 10% to 90% (Loads are C.R mode) during 1ms to 100ms.
#2: Turn on alarm delay time is less than 2500ms.
#3: The +12V / -55V power on delay time is less than 1s.
#4: AC turn off to +12V / -55V output hold up time higher than 16ms.
#5: Turn off alarm time is higher than 6ms.

PW OK Signal :
PW OK is a "power good" signal. It should be asserted high by the power supply to indicate that the -55V or +12V output is above the under-voltage thresholds (95% of output voltage rating level), Conversely, PW OK should be de-asserted to a low state when any of the -55V or +12V output voltage falls below its under-voltage threshold, or when mains power has been removed for a time sufficiently long such that power supply operation cannot be guaranteed beyond the power-down warning time. The electrical and timing characteristics of the PW OK signal are given in below.

Signal type	+3.3V TTL compatible
Logic level low	≦ 0.8V while sinking 3 mA
Logic level high	Between 2V and 3.63V output while sourcing 400 μA
High state output impedance	4.7KΩ from output to common
Turn on alarm delay time	When -55V and +12V output reach 95% normal output of the rated output voltage, and set the PW OK signal to high level within 2.5 seconds.
Turn off alarm time	The AC input turn off, and the power supply pulls the PW OK signal to low at least 6ms before the 12V output voltage drops to 10.8V and the -55V output voltage drops to -49.5V to indicate a fault.

PS Present :
This signal connects to +12V_return inside the power supply via 1KΩ resistor.

Output Fault Protection Isolation :
The power supply shall have an output isolation circuit (also known as ORing or paralleling circuit) in series with the positive output terminals for -55V, and the +12V bias (keep alive circuit)

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	Refer to Power de-rating	-20	-	+70	°C
Power De-rating	Operating Temperature at +50°C to +70°C	2.5			%/°C
Storage Temperature	Non-operation	-40	-	+85	
Operating Humidity	Non-condensing	10	-	90	%
Storage Humidity		5	-	95	
Altitude	Operating altitude	-	-	5,000	meter
Dielectric Strength Test	Input - FG	1,800	-	-	VAC
	-55V output to +12V output	1,800			VAC
	-55V output to FG	1,800			VAC
Insulation Resistance	Input– FG, 500VDC, 3 seconds at 25°C and 70% RH	20	-	-	MΩ
Mean Time Between Failure	At 230VAC/50Hz, 100% load, 25°C, Telcordia SR332, issue 4.	900,000	-	-	Hrs.
Vibration	Operating：2.94 m/s^2 , 5-150Hz, 10 minutes per cycle, 30 minutes for each X, Y and Z axis.				

	Non-operating：5.88 m/s^2 , 5-150Hz, 10 minutes per cycle, 30 minutes for each X, Y and Z axis.
Shock	Operating：The power supply shall not be damaged during a shock of half sine 10G, 11mS pulse, 100 pulses in each direction.
	Non-operating：The power supply shall not be damaged during a shock of 50G with an 11mS half sine wave.

Operating Temperature :
Some specifications may not be met below 0°C.

Altitude :
For every 305 meters of altitude increase, the operating ambient temperature needs to be decreased by 1°C.

Safety Approvals

Safety Standard	-	UL/cUL UL 62368-1, 3rd Edition CB IEC 62368-1, 3rd Edition
Safety Class	-	Class I

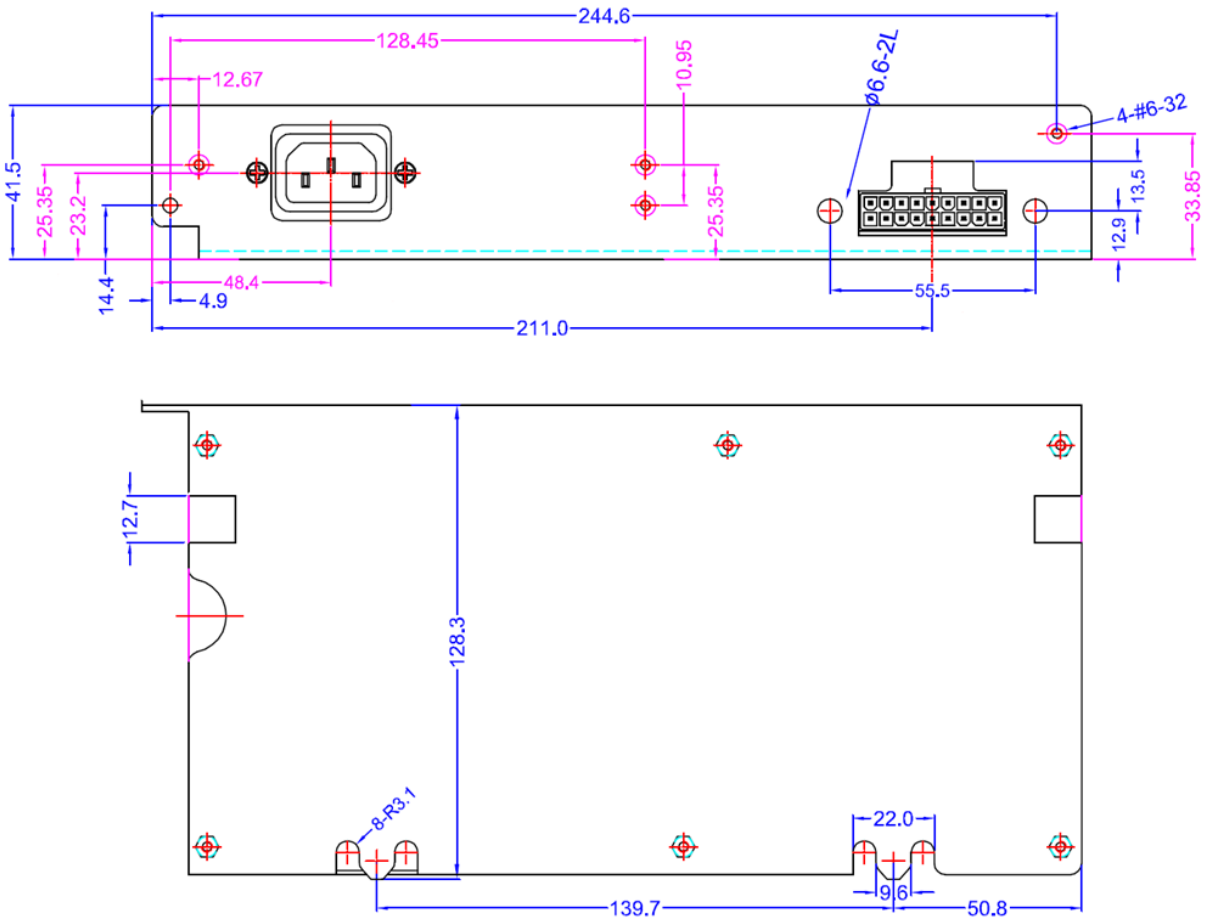
Electromagnetic Compatibility (EMC)

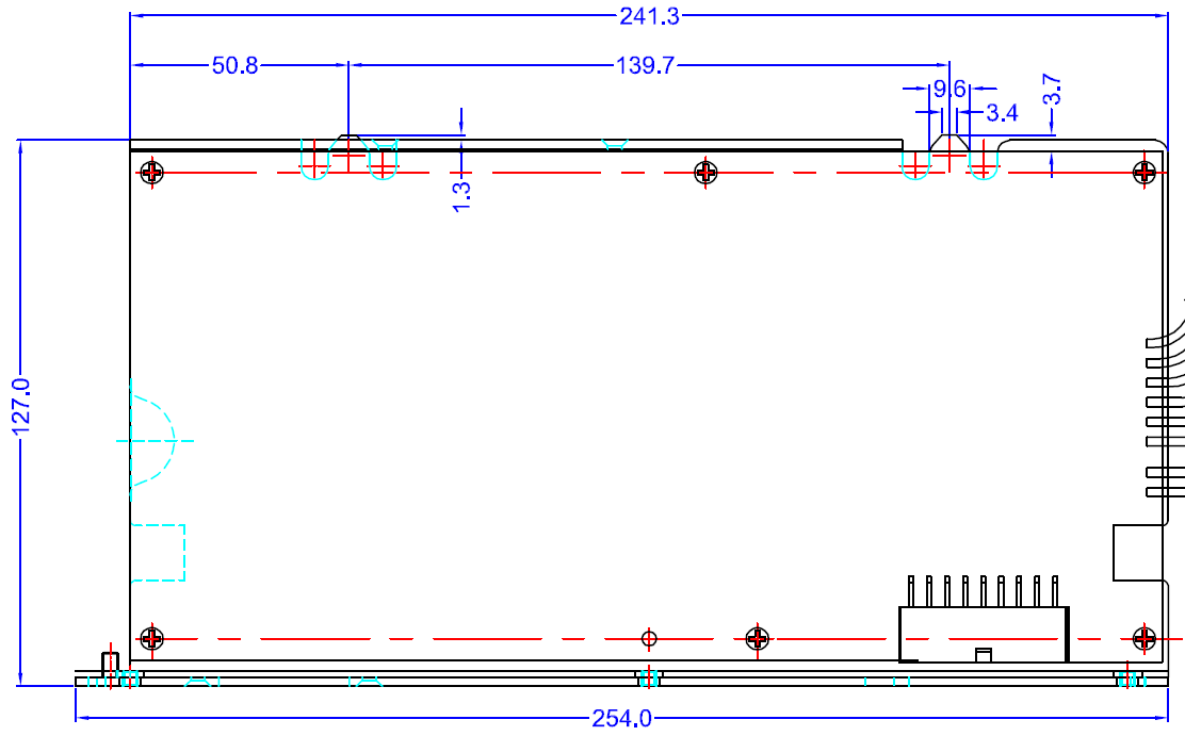
Emissions	CE	EN55032 (CISPR32) Class B	
	RE	EN55032 (CISPR32) Class B	
	Harmonic Current	IEC/EN61000-3-2 Class A	
	Flicker	IEC/EN61000-3-3	
Immunity	ESD	IEC/EN61000-4-2, level 4, Contact +/- 8KV; Air discharge +/-15KV	Criteria A
	RS	IEC/EN61000-4-3, level 3, 10V/m	Criteria A
	EFT	IEC/EN61000-4-4, level 3, +/- 2KV	Criteria A
	Surge	IEC/EN61000-4-5, level 4, Line to Line +/-2KV; Line to Earth +/-4KV	Criteria A
	CS	IEC/EN61000-4-6, level 2	Criteria A
	PFMF	IEC/EN61000-4-8, level 1	Criteria A
	DIP	IEC/EN61000-4-11	Criteria B

Dimensions and Recommended Layout

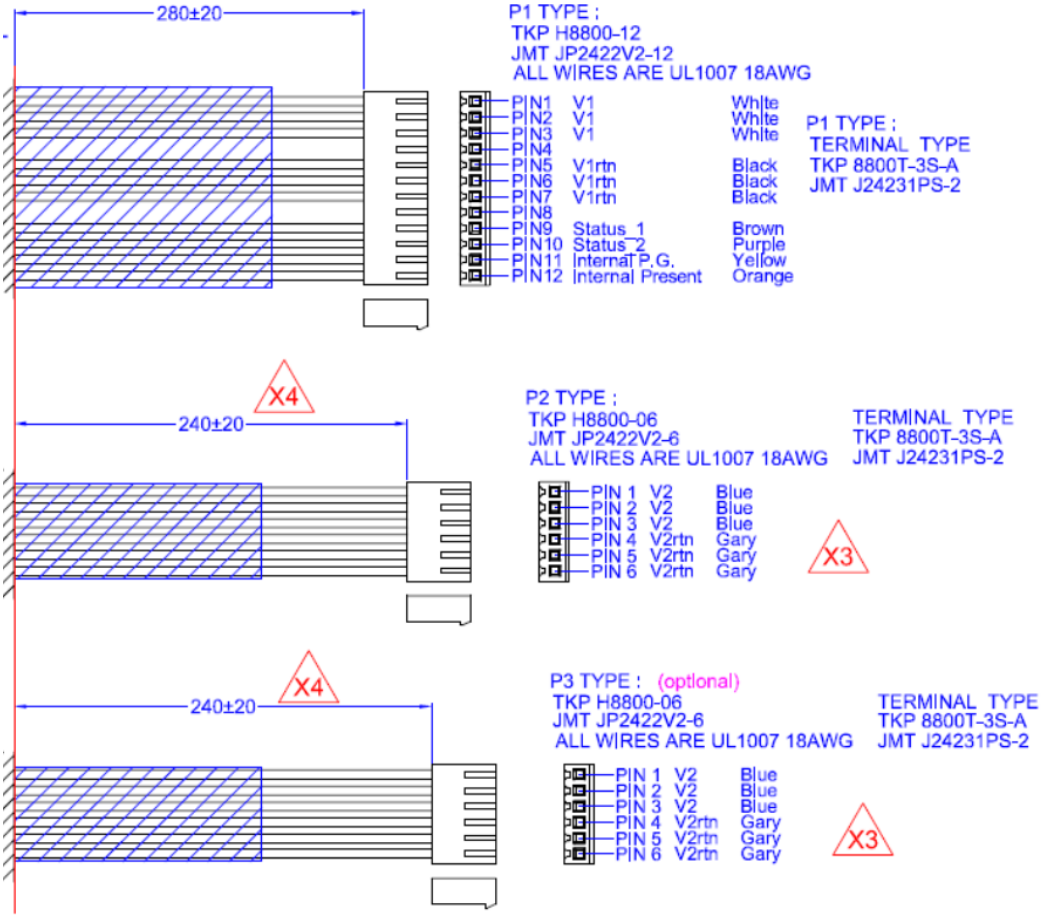
Item	Value	Unit
Weight (Typ.)	1217	g
Size (L x W x H)	254 x 127 x 41.5	mm

Outline Drawing: (Unit: mm, Tolerance: ±1.0 mm)





Output Connector

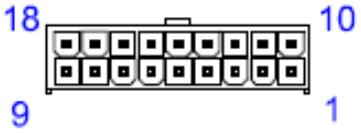


RPS Interface

V1： +12V output

V2： -55V output

RPS interface



PIN NO.	DESIGNATION
1	V1
2	V1
3	V1
4	V1Vrtn
5	V1Vrtn
6	NC
7	V2
8	V2
9	V2Vrtn
10	Status_1
11	Status_2
12	V1 LS
13	V1Vrtn
14	NC
15	V2 LS
16	V2
17	V2Vrtn
18	V2Vrtn