

PFE1100-12-054xD

DC-DC Front-End Power Supply

The PFE1100-12-054xD is a 1100 watt DC to DC power supply that converts DC input into a main output of 12 VDC for powering intermediate bus architectures (IBA) in high performance and reliability servers, routers, and network switches.

The PFE1100-12-054xD meets international safety standards and displays the CE-Mark for the European Low Voltage Directive (LVD).





Key Features & Benefits

- Best-in-class, 80 PLUS certified "Platinum" efficiency
- Best-in-class, "Platinum level" efficiency
- Wide input voltage range: 40 72 VDC
- Always-On 16.5 W programmable standby output (3.3 / 5 V)
- Hot-plug capable
- Parallel operation with active digital current sharing
- High density design: 25.6 W/in³
- Small form factor: 321.5 x 54.5 x 40 mm (12.66 x 2.14 x 1.57 in)
- I²C communication interface for control, programming and monitoring with PSMI and Power Management Bus protocol
- Overtemperature, output overvoltage and overcurrent protection
- 256 Bytes of EEPROM for user information
- 2 Status LEDs: IN OK and OUT OK with fault signaling

Applications

- High Performance Servers
- Routers
- Switches



1. ORDERING INFORMATION

PFE	1100		12		054	x	D
Product Family	Power Level	Dash	V1 Output	Dash	Width		Input
PFE Front-Ends	1100 W		12 V		54 mm	N: Normal air flow R: Reverse air flow S: Screw type input connector / normal air flow T: Screw type input connector / reverse air flow	D: DC

2. INPUT SPECIFICATIONS

General Condition: $T_A = 0...45$ °C unless otherwise specified.

PARAN	METER	CONDITIONS / DESCRIPTION	MIN	NOM	MAX	UNIT
$V_{i nom}$	Nominal input voltage			53		VDC
$V_{\rm i}$	Input voltage ranges	Normal operating ($V_{i min}$ to $V_{i max}$)	40		72	VDC
I _{max}	Max input current				33	A_{rms}
Иp	Inrush Current Limitation	$V_{i min}$ to $V_{i max}$			60	Ap
$V_{\rm i}$ on	Turn-on input voltage ¹	Ramping up	42		45	VDC
$V_{i \text{ off}}$	Turn-off input voltage ¹	Ramping down	37		40	VDC
		$V_{1 \text{ nom}}$, $0.1 \cdot I_{2 \text{ nom}}$, $V_{2 \text{ nom}}$, $T_{A} = 25 \text{ °C}$		89.3		
	Efficiency without fan	$V_{i \text{ nom}}$, $0.2 \cdot I_{k \text{ nom}}$, $V_{x \text{ nom}}$, $T_{A} = 25 \text{ °C}$		93.5		%
η	Efficiency without fair	$V_{\text{i nom}}$, 0.5· $I_{\text{x nom}}$, $V_{\text{x nom}}$, $T_{\text{A}} = 25 ^{\circ}\text{C}$		95		90
		$V_{i \text{ nom}}$, $I_{x \text{ nom}}$, $V_{x \text{ nom}}$, $T_{A} = 25 \text{ °C}$		92.9		
T _{hold}	Hold-up Time	$V_1 > 10.8 \text{ V}$, V _{SB} within regulation, $V_1 = 53 \text{ VDC}$, $P_{x \text{ nom}}$	5			ms

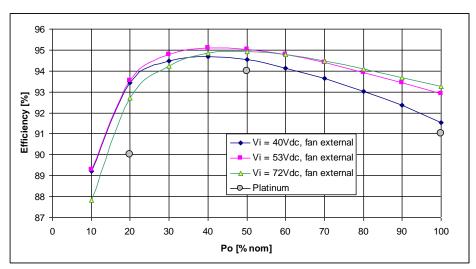


Figure 1. Efficiency

¹ The Front-End is provided with a minimum hysteresis of 3 V during turn-on and turn-off within the ranges.



3. OUTPUT SPECIFICATIONS

General Condition: $T_A = 0... 45$ °C unless otherwise specified.

Main Output VI Mominal Output Voltage 0.5 - k now, Tamb = 25 °C 12 VDC V sut Output Setpoint Accuracy 0.5 - k now, Tamb = 25 °C -0.5 +0.5 % No room P room Nominal Output Power V = 12 VDC 1080 W A room Nominal Output Current V = 12 VDC 90 ADC V 1 so Output Ripple Voltage V room, A room 20 MHz BW, 10nF/16WXZR/1210 + 10uF/16V at I/L 150 mVpo Uf Loast Load Regulation V = Now, 0 - 100 % h room 80 mV d Visual Load Regulation V = Now, 0 - 100 % h room 95 105 ADC d Final Current Limitation 95 105 ADC d Final Current Sharing Deviation from h to N / N / > 100% h room -3 +3 A d Vig Dynamic Load Regulation Δh = 50% h room, h = 5 100% h room -0.6 0.6 V Tree Recovery Time dh/fdr = 1 Alys, recovery within 1% of V room 1 10 ms δω vi Start-Up Time From DC V = 1	PARAM	IETER	CONDITIONS / DESCRIPTION	·	MIN	NOM	MAX	UNIT
V _{1 set} Output Setpoint Accuracy 0.5 + nem, T _{ambs} = 25 °C −0.5 +0.5 % K nem d N tox Total Regulation N _{min} to V _{max} , 0 to 100% h nem, T _{ambs} = 7. −1 +1 % K nem A nom Nominal Output Current N = 12 VDC 1080 W M nom Nominal Output Current N = 12 VDC 90 ADC M nom Nominal Output Rower N = 12 VDC 90 ADC M nom Output Ripple Voltage N = nem, no − 100 M h nom 80 mV d N towal Load Regulation N = M _{nom} , 0 − 100 % h nom 80 mV d N towal Current Limitation N = M _{nom} , 0 − 100 % h nom 95 105 ADC d N _{max} Current Sharing Deviation from h to N N, N > 10% −3 +3 A d N _{max} Current Sharing Deviation from h to N, N > 10% −3 +3 A d N _{max} Dynamic Load Regulation N = 50 100 % h nom −0.6 0.6 0.6 M towal Start-Up Time From DC N = 10.8 VDC	Main Ou	utput V ₁						
V set Output Setpoint Accuracy -0.5 +0.5 % K nam d N tot Total Regulation Vmin to Vinsus, 0 to 100% h nom, 7a min to 7a max -1 +1 % K nam A nom Nominal Output Current Vi = 12 VDC 1080 W A nom Nominal Output Current Vi = 12 VDC 90 ADC V nom Output Ripple Voltage 10n m, 20 MHz BW, 150 95 150 mVpp d N Load Load Regulation V = Vinnen, 20 MHz BW, 150 10 mV mV M Institute Line Regulation V = Vinnen, 20 MHz BW, 150 10 mV mV M Institute Line Regulation V = Vinnen, 20 MHz BW, 150 -3 43 A ADC d Start Lup Time From DC All = 50% A nom, A = 5 100% A nom, -0 -0.6 0.6 V M Institute Start-Up Time From DC V = 10.8 VDC 2 sec 10 ms All rise Output Setpoint Accuracy V = 10.8 VDC 3 3 43 A VSB nom No	V _{1 nom}	Nominal Output Voltage	0.5 · /· T 25 °C			12		VDC
P nom Nominal Output Power N = 12 VDC 1080 W Λ nom Nominal Output Current N = 12 VDC 90 ADC ν po Output Ripple Voltage 10π mm. A nom., 20 MHz BW, 10π Mm. 90 ADC ν po Output Ripple Voltage 10π mm. 150 mVpp d V Load Load Regulation N = N mm. 20 mm. 80 mV d V Load Load Regulation N = N mm. 4 mm. 10 mV Λ max Current Limitation N = N mm. 10% mV ADC Δ floar Current Sharing Deviation from Λ tash / N , h > 10% -3 +3 A DC Δ floar Current Sharing Deviation from Λ tash / N , h > 10% -3 +3 A DC Δ floar Current Sharing Deviation from Λ tash / N , h > 10% -3 +3 A DC Δ floar Start-Up Time From DC N = 10 100% / Λ tom. -0.6 0.6 V Λ floar Start-Up Time From DC N = 10 90% N mm. 1 1	V₁ set	Output Setpoint Accuracy	0.5 71 nom, 7amb – 25 C		-0.5		+0.5	% V _{1 nom}
A nom Nominal Output Current W = 12 VDC 90 ADC ν pp Output Ripple Voltage 10 ms, x son, 20 MHz BW, 10 ms, x son, x	$d \mathcal{V}_{1 \text{ tot}}$	Total Regulation	V_{1min} to V_{1max} , 0 to 100% H_{1nom} , T_{2n}	nin to $\mathcal{T}_{a \text{ max}}$	-1		+1	% 1/1 nom
V1 pp Output Ripple Voltage V1 mom, A mom, 20 MHz BW, 100F/16Va t V; 100F/16Va t V	P _{1 nom}	Nominal Output Power	V ₁ = 12 VDC			1080		W
March County C	A nom	Nominal Output Current	V ₁ = 12 VDC			90		ADC
d V Line Line Regulation V = V_mm V max 10 mV Λ max Current Limitation 95 105 ADC d Monare Current Sharing Deviation from Λ tot / N, Λ > 10% -3 +3 A d Monare Current Sharing Deviation from Λ tot / N, Λ > 10% -3 +3 A d Monare Recovery Time d Λ d Ze 1 A/us, recovery within 1% of V nom -0.6 0.6 V Λε ν 1 Start-Up Time From DC V = 10.8 VDC 2 sec Λε 1 rise Rise Time V = 10.8 VDC 2 sec Λε 1 rise Rise Time V = 1090% V nom 1 10 ms Λε 1 rise Rise Time V = 1090% V nom 1 10 ms Standby Output Vst VSB_SEL = 1 3.3 VDC VSB_SEL Output Setpoint Accuracy VSB_SEL = 0 5 VDC VSB_SEL Total Regulation V_min to V_max 0 to 100% kB nom, 7 a min to 7 a max -2 +2 % kBnom <t< td=""><td>V1 pp</td><td>Output Ripple Voltage</td><td></td><td>at V₁</td><td></td><td></td><td>150</td><td>mVpp</td></t<>	V 1 pp	Output Ripple Voltage		at V ₁			150	mVpp
A max Current Limitation 95 105 ADC d Δπ see Current Sharing Deviation from Λ tot / N, Λ > 10% -3 +3 A d Woyn Dynamic Load Regulation ΔΛ = 50% Λ nom, Λ = 5 100% Λ nom, -0.6 0.6 V π cor Recovery Time ΔΛ = 50% Λ nom, Λ = 5 100% Λ nom, -0.6 0.6 V Λα vt Start-Up Time From DC V = 10.8 VDC 2 sec Λα vt Start-Up Time From DC V = 1090% Vi nom 1 10 ms Λα coad Capacitive Loading Λ = 25 °C VSB_SEL = 1 10 000 μF Standby Output Vsts VSB nom Nominal Output Voltage VSB_SEL = 0 5 VDC VSB set Output Setpoint Accuracy VSB_SEL = 0 5 VDC VSB set Output Setpoint Accuracy VSB_SEL = 0 5 VDC VSB set Output Setpoint Accuracy VSB_SEL = 0 1 16.5 W AB nom Nominal Output Power VSB_SEL = 0	d $arKappa_{ ext{Load}}$	Load Regulation	$V_i = V_{i \text{ nom}}, 0 - 100 \% h_{i \text{ nom}}$			80		mV
db/bare Current Sharing Deviation from h tot / N, h > 10% -3 +3 A d Mbyn Dynamic Load Regulation Δh = 50% h nom, h = 5 100% h nom. -0.6 0.6 V Trec Recovery Time Δh = 50% h nom, h = 5 100% h nom. -0.6 0.6 V Δc V1 Start-Up Time From DC V = 10.8 VDC 2 sec M1 rise Rise Time V = 1090% l/nom 1 10 ms Qcad Capacitive Loading Ta = 25 °C VSB_SEL = 1 3.3 VDC Standby Output Vss VSB set Output Setpoint Accuracy VSB_SEL = 1 3.3 VDC VSB set Output Setpoint Accuracy VSB_SEL = 0 5 VDC VSB set Total Regulation Vimin to Vimax 0 to 100% ksp nom. Ta min to Ta max -2 +2 % Vsspsnom AB nom Nominal Output Power VSB_SEL = 0 / 1 16.5 W KsB nom Nominal Output Current Vss = 5.0 VDC 3.3 ADC VsB pp Output Ripple Voltage </td <td>d $\not\!\! N$ Line</td> <td>Line Regulation</td> <td>$V_i = V_{i \text{ min}} V_{i \text{ max}}$</td> <td></td> <td></td> <td>10</td> <td></td> <td>mV</td>	d $\not\!\! N$ Line	Line Regulation	$V_i = V_{i \text{ min}} V_{i \text{ max}}$			10		mV
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	h max	Current Limitation			95		105	ADC
Troc Recovery Time	d/share	Current Sharing	Deviation from h_{tot} / N, $h > 10\%$		-3		+3	Α
TecOvery Time TecOvery Ti	dV_{dyn}	Dynamic Load Regulation	$\Delta h = 50\% h_{\text{nom}}, h = 5 \dots 100\% h$	nom,	-0.6		0.6	V
An risse Rise Time Vi = 1090% Vi nom 1 10 ms G_coad Capacitive Loading Ta = 25 °C 10 000 μF Standby Output VsB VSB_set VSB_SEL = 1 3.3 VDC VsB set Output Setpoint Accuracy VSB_SEL = 0 / 1 -0.5 +0.5 % Vi nom dVsB tot Total Regulation V _{min} to V _{max} , 0 to 100% ks nom, 7a min to 7a max -2 +2 % VsB.nom RsB nom Nominal Output Power VSB_SEL = 0 / 1 -0.5 ADC ADC VsB nom Nominal Output Current VsB = 3.3 VDC 5 ADC VsB pp Output Ripple Voltage VsB snom, 8s nom, 20 MHz BW, 10nF/16V/X7R/1210 + 10uF/16V at VsB 100 mVpp dVsB max Droop 0 - 100 % ks nom VSB_SEL = 1 5.25 6 ADC ks max Current Limitation VSB_SEL = 0 3.45 4.3 ADC dVsB spite Dynamic Load Regulation Recovery Time Ass now 10 ks nom, ks = 5 100% ks nom, sp = 5 100% ks nom, nom 10 ks nom, nom 10 ks nom, nom 10 ks nom, nom 10 ks nom, n	\mathcal{T}_{rec}	Recovery Time	$dh/dt = 1 A/\mu s$, recovery within 19	% of V₁ nom			1	ms
	t _{AC V1}	Start-Up Time From DC	V ₁ = 10.8 VDC				2	sec
Standby Output VsB VsB nom Nominal Output Voltage VsB_SEL = 1 3.3 VDC VsB set Output Setpoint Accuracy VsB_SEL = 0 / 1 -0.5 +0.5 % V nom dVsB tot Total Regulation V_min to V_max, 0 to 100% ks nom, Ta min to Ta max -2 +2 % Vsenom PsB nom Nominal Output Power VsB_SEL = 0 / 1 16.5 W ks nom Nominal Output Current VsB = 3.3 VDC 5 ADC ks nom Nominal Output Current VsB = 5.0 VDC 3.3 ADC VsB pp Output Ripple Voltage VsB nom, ks nom, 20 MHz BW, 10nF/16VXTR/1210 + 10uF/16V at VsB 100 mVpp dVsB Droop 0 - 100 % ks nom VSB_SEL = 1 67 mV ks max Current Limitation VsB_SEL = 1 5.25 6 ADC ks max Current Limitation VsB_SEL = 0 3.45 4.3 ADC dVsB Sell = 0 VsB_SEL = 0 3.45 4.3 ADC dVsB max Output New popularity in the form DC Input VsB no	t∕v1 rise	Rise Time	$V_1 = 1090\% V_{1 \text{ nom}}$		1		10	ms
VSB_SEL = 1 3.3 VDC	C_{Load}	Capacitive Loading	<i>T</i> _a = 25 °C				10 000	μF
VEB nom Nominal Output Voltage $0.5 \cdot k_{\rm SB nom}, T_{\rm amb} = 25 ^{\circ}{\rm C}$ VSB_SEL = 0 / 1	Standby	∕ Output V _{SB}						
VSB set Output Setpoint Accuracy VSB_SEL = 0 / 1	14-	Naminal Output Valtage		VSB_SEL = 1		3.3		VDC
$dV_{SB tot}$ Total Regulation $V_{I min}$ to $V_{I max}$, 0 to 100% $I_{SB nom}$, $T_{a min to}$ $T_{a max}$ -2 +2 % $V_{SB nom}$ $P_{SB nom}$ Nominal Output Power VSB_SEL = 0 / 1 16.5 W $I_{SB nom}$ Nominal Output Current I_{SB} = 3.3 VDC 5 ADC $I_{SB nom}$ Nominal Output Current I_{SB} = 5.0 VDC 3.3 ADC $I_{SB pp}$ Output Ripple Voltage $I_{SB nom}$, $I_{SB SEL}$ = 1 67 mV $I_{SB max}$ Output Ripple Voltage $I_{SB nom}$, $I_{SB nom}$, $I_{SB nom}$, $I_{SB nom}$, $I_{SB SEL}$ = 0 $I_{SB nom}$ $I_{SB nom}$, $I_{SB nom}$ $I_{SB nom}$,	VSB nom	Nominal Output Voltage	$0.5 \cdot I_{SB \text{ nom}}, T_{amb} = 25 ^{\circ}\text{C}$	VSB_SEL = 0		5		VDC
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	V∕s _{B set}	Output Setpoint Accuracy		VSB_SEL = 0 / 1	-0.5		+0.5	% V _{1 nom}
$k_{\rm SB\ nom}$ Nominal Output Current $V_{\rm SB} = 3.3\ \rm VDC$ 5 ADC $V_{\rm SB\ pp}$ Output Ripple Voltage $V_{\rm SB\ nom}$ $k_{\rm SB\ nom}$ k	dV _{SB tot}	Total Regulation	$V_{i min}$ to $V_{i max}$, 0 to 100% $I_{SB nom}$, T_{a}	min to $\mathcal{T}_{a \text{ max}}$	-2		+2	% V _{SBnom}
$k_{\rm B}$ nom Nominal Output Current $V_{\rm SB}$ = 5.0 VDC 3.3 ADC $V_{\rm SB}$ pp Output Ripple Voltage $V_{\rm SB}$ nom, $k_{\rm B}$ nom, 20 MHz BW, 10nF/16V/X7R/1210 + 10uF/16V at $V_{\rm SB}$ 100 mVpp $d_{\rm VSB}$ Droop 0 - 100 % $k_{\rm B}$ nom VSB_SEL = 1 VSB_SEL = 1 67 MV mV $k_{\rm SB}$ max Current Limitation VSB_SEL = 1 VSB_SEL = 0 5.25 6 ADC $V_{\rm SB}$ SEL = 0 VSB_SEL = 0 3.45 4.3 ADC $V_{\rm SB}$ Dynamic Load Regulation Recovery Time $\Delta k_{\rm SB}$ = 50% $k_{\rm SB}$ nom, $k_{\rm SB}$ = 5 100% $k_{\rm SB}$ nom, $k_{\rm SB}$ nom, $k_{\rm SB}$ nom, $k_{\rm SB}$ nom, $k_{\rm SB}$ nom -3 Sec $A_{\rm C}$ VSB Start-Up Time from DC Input $V_{\rm SB}$ = 90% $V_{\rm SB}$ nom 2 sec $A_{\rm C}$ VSB rise Rise Time $V_{\rm SB}$ = 1090% $V_{\rm SB}$ nom 4 10 ms	P _{SB nom}	Nominal Output Power	VSB_SEL = 0 / 1			16.5		W
$V_{\rm SB} = 5.0 \rm VDC$ 3.3 ADC $V_{\rm SB pp}$ Output Ripple Voltage $V_{\rm SB nom}$, $E_{\rm SB nom}$, 20 MHz BW, 10nF/16V/X7R/1210 + 10uF/16V at $E_{\rm SB}$ 100 mVpp d $V_{\rm SB}$ Droop 0 - 100 % $E_{\rm SB nom}$ VSB_SEL = 1 VSB_SEL = 1 67 mV $E_{\rm SB max}$ Current Limitation VSB_SEL = 1 VSB_SEL = 0 44 mV d $V_{\rm SB dyn}$ Dynamic Load Regulation $V_{\rm SB SEL} = 0$ 3.45 4.3 ADC d $V_{\rm SB dyn}$ Dynamic Load Regulation $V_{\rm SB SEL} = 0$ 3.45 4.3 ADC d $V_{\rm SB dyn}$ Dynamic Load Regulation $V_{\rm SB B nom}$ $V_{\rm SB mom}$ -3 3 % $V_{\rm SB nom}$ $V_{\rm CE}$ Recovery Time $V_{\rm SB mom}$ 250 $V_{\rm SB mom}$ $V_{\rm CE}$ $V_{\rm SB mom}$ 2 sec $V_{\rm SB rise}$ Rise Time $V_{\rm SB mom}$ 4 10 ms	4-	Naminal Output Current	$V_{SB} = 3.3 \text{ VDC}$			5		ADC
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	/SB nom	Nominal Output Current	V _{SB} = 5.0 VDC			3.3		ADC
$ \text{d $V\!$	V _{SB pp}	Output Ripple Voltage		at V _{SB}			100	mVpp
$ VSB_SEL = 0 \\ k_{SB \; max} Current \; Limitation \\ VSB_SEL = 1 \\ VSB_SEL = 0 \\ VSB$		_				67		mV
$k_{\rm B max}$ Current LimitationVSB_SEL = 03.454.3ADCd $V_{\rm SB dyn}$ Dynamic Load Regulation $\Delta k_{\rm B} = 50\% k_{\rm B nom}, k_{\rm B} = 5 \dots 100\% k_{\rm B nom}, $ -33% $V_{\rm SB nom}$ $T_{\rm rec}$ Recovery Time $dk/dt = 0.5 \text{AV} \mu \text{s}, \text{recovery within } 1\% \text{of } V_{\rm nom}$ 250 μs $t_{\rm AC VSB}$ Start-Up Time from DC Input $V_{\rm SB nom}$ 2sec $t_{\rm VSB rise}$ Rise Time $V_{\rm SB nom}$ 410ms	d V _{SB}	Droop	0 - 100 % /sB nom	VSB_SEL = 0		44		mV
$VSB_SEL = 0 \qquad 3.45 \qquad 4.3 \qquad ADC$ $d \ V_{SBdyn} \qquad Dynamic \ Load \ Regulation \qquad \Delta \ell_{SB} = 50\% \ \ell_{SB \ nom}, \ \ell_{SB} = 5 \dots 100\% \ \ell_{SB \ nom}, \qquad -3 \qquad 3 \qquad \% \ V_{SB \ nom}$ $T_{rec} \qquad Recovery \ Time \qquad d\ell_{SB} = 50\% \ \ell_{SB \ nom}, \ \ell_{SB} = 5 \dots 100\% \ \ell_{SB \ nom}, \qquad 250 \qquad \mu_{S}$ $\ell_{AC \ VSB} \qquad Start-Up \ Time \ from \ DC \ Input \qquad V_{SB} = 90\% \ V_{SB \ nom} \qquad 2 \qquad sec$ $\ell_{VSB \ rise} \qquad Rise \ Time \qquad V_{SB} = 10\dots 90\% \ V_{SB \ nom} \qquad 4 \qquad 10 \qquad ms$,	Ourse at Line that is a	VSB_SEL = 1		5.25		6	ADC
T_{rec} Recovery Time $db/dt = 0.5 \text{ A/µs, recovery within 1% of } V_{\text{nom}}$ 250 µs $t_{\text{AC VSB}}$ Start-Up Time from DC Input $V_{\text{SB}} = 90\% V_{\text{SB nom}}$ 2 sec $t_{\text{VSB rise}}$ Rise Time $V_{\text{SB}} = 1090\% V_{\text{SB nom}}$ 4 10 ms	/SB max	Current Limitation	VSB_SEL = 0		3.45		4.3	ADC
T_{rec} Recovery Timed l_0 /d t = 0.5 A/μs, recovery within 1% of l_1 nom250μs $t_{\text{AC VSB}}$ Start-Up Time from DC Input l_2 sec $t_{\text{VSB rise}}$ Rise Time l_2 l_2 l_3	d V _{SBdyn}	Dynamic Load Regulation	$\Delta I_{SB} = 50\% I_{SB \text{ nom}}, I_{SB} = 5 \dots 100\%$	% IsB nom,	-3		3	% V _{SBnom}
t/sB rise	\mathcal{T}_{rec}	Recovery Time	$d\hbar/dt = 0.5 \text{ A/}\mu\text{s}$, recovery within	1% of V₁ nom			250	μs
	t _{AC VSB}	Start-Up Time from DC Input	V _{SB} = 90% V _{SB nom}				2	sec
C_{Load} Capacitive Loading $T_{amb} = 25 ^{\circ}\text{C}$ 10000 μF	t/VSB rise	Rise Time	V _{SB} = 1090% V _{SB nom}		4		10	ms
	CLoad	Capacitive Loading	T _{amb} = 25 °C				10000	μF



4. SIGNAL & CONTROL SPECIFICATIONS

4.1 FRONT LEDS

OPERATING CONDITION	LED SIGNALING
IN LED (INPUT OK)	
DC Line within range	Solid Green
DC Line UV condition	Off
Redundant Operation - PSU1 operating and PSU2 has input power removed	Solid Yellow (PSU2) 1
OUT LED ² (OUTPUT OK)	
PSON High	Blinking Yellow (1:1)
Hot-Standby Mode	Blinking Yellow/Green (1:2)
V₁ or V _{SB} out of regulation	
Over temperature shutdown	
Output over voltage shutdown ($\ensuremath{\emph{V}}_1$ or $\ensuremath{\emph{V}}_{SB}$)	Solid Yellow
Output over current shutdown (1/1 or 1/5B)	
Fan error (>15%)	
Over temperature warning	Blinking Yellow/Green (2:1)
Minor fan regulation error (>5%, <15%)	Blinking Yellow/Green (1:1)
Redundant Operation - PSU1 operating and PSU2 has input power removed	Off (PSU2)

¹ The LEDs will be ON till input power from PSU1 is removed.

Table 1. LED Status

The front-end has 2 front LEDs showing the status of the supply. LED number one is green and indicates DC power is on or off, while LED number two is bi-colored: green and yellow and indicates DC power presence or fault situations. For the position of the LEDs see Figure 5.



² The order of the criteria in the table corresponds to the testing precedence in the controller.

4.2 GRAPHICAL USER INTERFACE

The Bel Power Solutions provides with its "I²C Utility" a Windows® XP/Vista/Win7 compatible graphical user interface allowing the programming and monitoring of the PFE1100-12-054xD Front-End.

The utility can be downloaded on www.belpowersolutions.com and supports both the PSMI and Power Management Bus protocols.

The GUI allows automatic discovery of the units connected to the communication bus and will show them in the navigation tree. In the monitoring view the power supply can be controlled and monitored.

If the GUI is used in conjunction with the PFE1100-12-054xD Evaluation Kit it is also possible to control the PSON pin(s) of the power supply.

Further there is a button to disable the internal fan for approximately 5 seconds (not implemented yet). This allows the user to take input power measurements without fan consumptions to check efficiency compliance to the Climate Saver Computing Platinum specification.

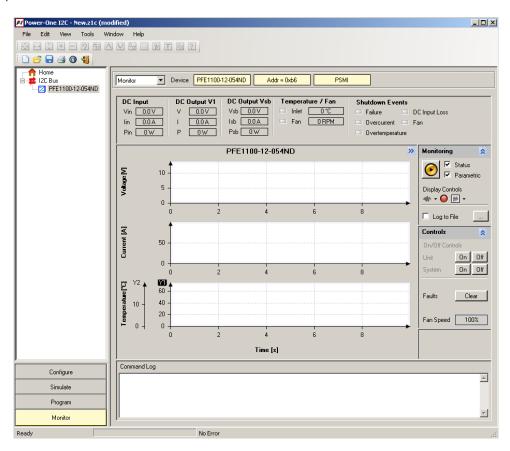


Figure 2. I2C Bus to uC (Graphical User Interface)

The monitoring screen also allows to enable the hot-standby mode on the power supply. The mode status is monitored and by changing the load current it can be monitored when the power supply is being disabled for further energy savings. This obviously requires 2 power supplies being operated as a redundant system (like the evaluation kit).

NOTE: The user of the GUI needs to ensure that only one of the power supplies have the hot-standby mode enabled.



5. ELECTROMAGNETIC COMPATIBILITY

NOTE: Meets the EMC requirements according to EN IEC 61204-3, EN 55035 and EN 55032.

5.1 IMMUNITY

TEST	STANDARD / DESCRIPTION	CRITERIA
ESD Contact Discharge	IEC / EN 61000-4-2, ±8 kV, 25 + 25 discharges per test point (metallic case, LEDs, connector body)	В
ESD Air Discharge	IEC / EN 61000-4-2, ±15 kV, 25 + 25 discharges per test point (non-metallic user accessible surfaces)	В
Radiated Electromagnetic Field	IEC / EN 61000-4-3, 10 V/m, 1 kHz / 80% Amplitude Modulation, 1 μs Pulse Modulation, 10 kHz2 GHz	А
Burst	IEC / EN 61000-4-4, Level 3 Input DC port ±1 kV, 1 minute DC port ±0.5 kV, 1 minute	В
Surge	IEC / EN 61000-4-5 Line to earth: ±1 kV Line to line: ±0.5 kV	А
RF Conducted Immunity	IEC/EN 61000-4-6, Level 3, 10 Vrms, CW, 0.1 80 MHz	Α

5.2 EMISSION

TEST	STANDARD / DESCRIPTION	CRITERIA
Conducted Fasionica	EN55032 / CISPR 32: 0.15 30 MHz, QP and AVG, single unit, $V_1 = 53$ VDC, $P_{X \text{ nom}}$	Class A 6 dB margin
Conducted Emission	EN55032 / CISPR 32: 0.15 30 MHz, QP and AVG, 2 units in rack system, $V_1 = 53$ VDC, $P_{2 \text{ nom}}$	Class A 6 dB margin
Radiated Emission Acoustical Noise	EN55032 / CISPR 32: 30 MHz 1 GHz, QP, single unit, $V_1 = 53$ VDC, $P_{X \text{ nom}}$	Class A 6 dB margin
	EN55032 / CISPR 32: 30 MHz 1 GHz, QP, 2 units in rack system, $V_1 = 53 \text{ VDC}$, $P_{X \text{ nom}}$	Class A 6 dB margin
	Sound power statistical declaration (ISO 9296, ISO 7779, IS9295) @ 50% load	62 dBA

6. SAFETY / APPROVALS

Maximum electric strength testing is performed in the factory according to EN/IEC 62368-1, and UL 62368-1. Input-to-output electric strength tests should not be repeated in the field. Bel Power Solutions will not honor any warranty claims resulting from electric strength field tests.

PARA	METER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
	Agency Approvals	Approved to latest edition of the following standards: UL/CSA 62368-1, EN/IEC 62368-1				
		Input (L/N) to case (PE)		Basic		
	Isolation Strength	Input (L/N) to output		Basic		
		Output to case (PE)		Functional		
d	Croonage / Clearance	Primary (L/N) to protective earth (PE)				
<i>d</i> c	Creepage / Clearance	Primary to secondary				
	Electrical Strength Test	Input to case Input to output (tested by manufacturer only)	1500 1500			VDC



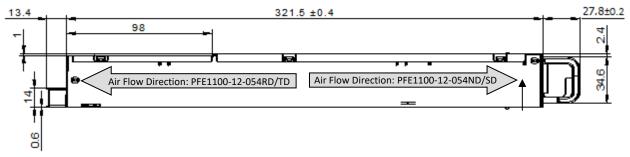
7. ENVIRONMENTAL SPECIFICATIONS

PARAM	METER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
T _A	Ambient Temperature	Vi min to Vi max, H nom, ASB nom	0		+45	°C
7 _{Aext}	Extended Temp. Range	Derated output	+45		+65	°C
		$V_{1 min}$ to $V_{1 max}/I_{1}$ < 77 A, $I_{SB nom}$			+55	°C
		$V_{1 min}$ to $V_{1 max}/I_{1} < 35 A$, $I_{SB nom}$			+65	°C
T_S	Storage Temperature	Non-operational	-20		+70	°C
<i>N</i> _a	Audible Noise	Sound power @ $V_{1 \text{ nom}}$, 50% $I_{0 \text{ nom}}$, $T_{A} = 25^{\circ}\text{C}$		62		dBA

8. MECHANICAL SPECIFICATIONS

PAR	AMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
		Width		54.5		
	Dimensions	Height		40		mm
		Depth		321.5		
М	Weight			1.12		kg

NOTE: Tolerance (unless otherwise stated): 0 - 30 mm: +/- 0.2 mm; 30 - 120 mm: +/- 0.4 mm; 120 - 400 mm: +/-0.6 mm



NOTES: A 3D step file of the power supply casing is available on request.

Unlatching the supply is performed by pulling the green trigger in the handle.

Figure 3. Side View 1

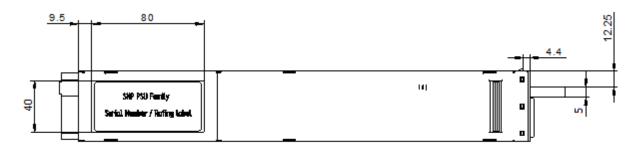


Figure 4. Top View



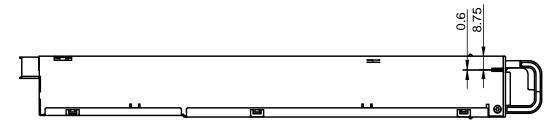


Figure 5. Side View 2

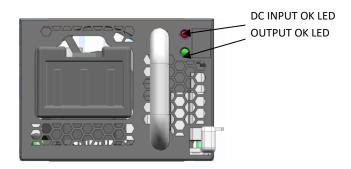
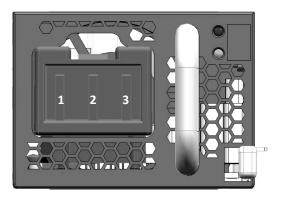


Figure 6. Front View (PFE1100-12-054ND/RD)

9. CONNECTIONS

9.1 INPUT CONNECTOR

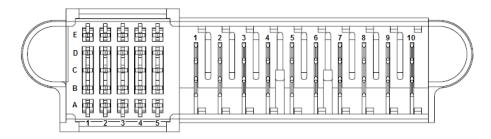


PIN	NAME	DESCRIPTION
Inp	ut	
1	Vin+	Input positive
2	Vin-	Input negative
3	PE	Ground 📳

Unit: China Aviation (JOHNON OPTRONIC) P/N DP5ZJW0300-001 Counter part: China Aviation (JOHNON OPTRONIC) P/N DP5TJY0300-001(provided)



9.2 OUTPUT CONNECTOR



Unit: Tyco Electronics P/N: 1926736-3

FCI P/N: 101-22460-007LF

Counter part: Tyco Electronics P/N: 2-1926739-5

FCI P/N: 10108888-R10253SLF

NOTE: Column 5 is lagging (short pins)

PIN	NAME	DESCRIPTION
Output		
6, 7, 8, 9, 10	V1	+12 VDC main output
1, 2, 3, 4, 5	PGND	Power ground (return)
Control Pins		
A1	VSB	Standby positive output (+3.3 / 5 V)
B1	VSB	Standby positive output (+3.3 / 5 V)
C1	VSB	Standby positive output (+3.3 / 5 V)
D1	VSB	Standby positive output (+3.3 / 5 V)
E1	VSB	Standby positive output (+3.3 / 5 V)
A2	SGND	Signal ground (return)
B2	SGND	Signal ground (return)
C2	HOTSTANDBYEN	Hot standby enable signal
D2	VSB_SENSE_R	Standby output negative sense
E2	VSB_SENSE	Standby output positive sense
A3	APS	I ² C address and protocol selection (select by a pull down resistor)
B3	nc	Reserved
C3	SDA	I ² C data signal line
D3	V1_SENSE_R	Main output negative sense
E3	V1_SENSE	Main output positive sense
A4	SCL	I ² C clock signal line
B4	PSON	Power supply on input (connect to A2/B2 to turn unit on)
C4	SMB_ALERT	SMB Alert signal output
D4	nc	Reserved
E4	INOK	DC input OK signal
A5	PSKILL	Power supply kill (lagging pin)
B5	ISHARE	Current share bus (lagging pin)
C5	PWOK	Power OK signal output (lagging pin)
D5	VSB_SEL	Standby voltage selection (lagging pin)
E5	PRESENT_L	Power supply present (lagging pin)

Table 2. Pin Description



9.3 INPUT CONNECTOR MODIFICATION - MODELS PFE1100-12-054SD/TD

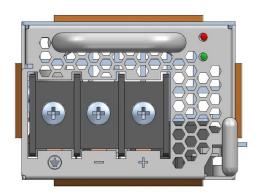


Figure 7. Front View (PFE1100-12-054SD/TD)

Unit: MF: Dinkle; P/N: DT-66-B11W-03

Counter part: Wire with lugs: 18 – 8 AWG (wire range); lugs for M4 screws

NOTE: Column 5 is lagging (short pins)

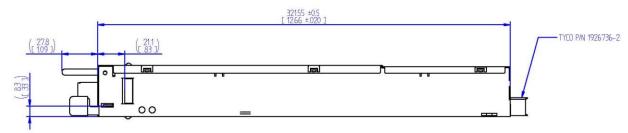


Figure 8. Side View (PFE1100-12-054SD/TD

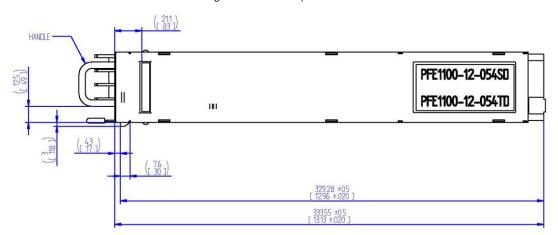
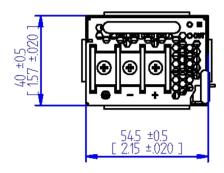


Figure 9. Top View (PFE1100-12-054SD/TD)





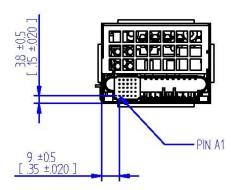


Figure 10. Front and Rear View (PFE1100-12-054SD/TD)

10. ACCESSORIES

ITEM	DESCRIPTION	ORDERING PART NUMBER	SOURCE
	I ² C Utility Windows XP/Vista/7 compatible GUI to program, control and monitor PFE Front-Ends (and other I ² C units)	N/A	belfuse.com/power-solutions
	USB to I ² C Converter Master I ² C device to program, control and monitor I ² C units in conjunction with the FC Utility	ZM-00056	Bel Power Solutions
	Dual Connector Board Connector board to operate 2 PFE units in parallel. Includes an on-board USB to I ² C converter (use <i>FC Utility</i> as desktop software)	SNP-OP-BOARD-01	Bel Power Solutions
	Cable Harness with Mating input Connector CHINA AVIATION, PN: DP5TJY0300-001, 2.44m length, 10AWG wire with 10mm stripping at the end, encased with braided sleeving	ZLH.00742	Bel Power Solutions
	Female Pin Connector Terminal Spare Mating Connectors	ZES.00046	Bel Power Solutions



11. APPENDIX

11.1 SOCKET CRIMPING OPERATION INSTRUCTION (DP5TJY0300-001)

I. CRIMPING TOOLS AND MACHINE PREPARATION

Machine needed before crimping: Terminal Crimping Machine, Crimping Mould, Crimping Tools, Wire Strippers, Utility Knife and Wrench.

NOTES: 1.Crimping tool need to install onto crimping mould, and crimping mould need to fix onto crimping machine.

- 2. Two factors must be considered during the design of crimping mould:
- A: must meet dimensions of tools installation.
- B: Easy to install in machine and be in machine effective itinerary

NAME	SUPPLIER	PART NUMBER
Terminal Crimping Machine	JonHon Optronic	THB Terminal Crimping Machine
Crimping Mould	JonHon Optronic	12A-01
Crimping tools	JonHon Optronic	YJD-DP5

Crimping tools YJD-DP5 including 4 parts: 4U-A5881-1, 4U-A5881-2, 4D-A5881-1, 4D-A5881-2. (See picture 1)

Table 1. A Set of Machine Recommended

II. CRIMPING MACHINE AND TOOLS INSTALLATION

Crimping mould and crimping tools must be installed well before crimping.

Install Requirements:

- Up tools 4U-A5881-1 and 4U-A5881-2 need install in dynamic mould. Down Tools 4D-A5881-1 and 4D-A5881-2 need install in static mould. (See picture 2)
- 2. 4 pieces of crimping tools can be divided into 2 pairs: 4U-A5881-1 mated with 4D-A5881-1, which is crimping cable jacket. 4U-A5881-2 match 4D-A5881-2, which is crimping cable core.
- Up tool 4U-A5881-1 has U-shaped hole. Customer can adjust the install position according to wire thickness, which
 to make sure the wire jacket and core will be crimping tightly. Tool 4D-A5881-1 need to install outside of crimping
 mould, in order to adjust tool 4U-A5881-1. (Reference at Picture 2)



Picture 1. YJD-DP5 (4 pieces crimping tools)





Picture 2. Tools Installation

III. CRIMPING

- Wire Cutting: Cutting wire with required length, and the wire can be used 8AWG American standard wire or other 8mm2 wire.
- 2. Wire Stripping: Stripping the wire jacket 8±1mm with Wire Strippers and cutting the jacket straight with Utility Knife. The wire should be at the set of bundles after stripping, shown as Picture 3.



Picture 3. The wire stripped

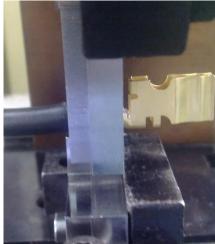


Picture 4. Wire and Terminal before Crimping

3. **Crimping:** Placing the wire and the terminal shown as picture 4, and placing them into the gap between up tool and down tool shown as picture 5.







Picture 5. Position before Crimping

Picture 6. Positon after crimped

- 4. Start the terminal crimping machine, and crimping closed shown as picture 6.
- 5. Test after Crimping
- a) Appearance Inspection: The crimped position should be smooth and firm. (reference see picture 7)



Picture 7.

If the severe deformation after crimping, we need to adjust the machine knob to adjust the crimping mould and distance between up tool and down tool, which to ensure the crimp the wire correctly and beautifully. Meanwhile, we need to avoid too much crimping strength so as to short the tools life, or even to damage the tools.

b) Pulling-Out Force Test: When the first batch after a terminal crimping, crimp pull out force should be inspected Test Method: Fixed the terminal and Non-crimped wire onto ends of tension meter, and then gradually increase the tension until the wire is pulled and separated from the terminal, and read the tension meter reading is to pull off the greatest force.

Qualification Criterion: When the pull-out force meets the requirements of Table 2, and then can show pull-out force is qualified.

Failure Treatment: When the pull-out force failed, we need to adjust the machine knob to adjust the crimping mould and distance between up tool and down tool, and then re-crimp until the test qualified. After that, we can make mass production.



CABLE SIZE	CORE CROSS-SECTIONAL AREA	PULL-OUT FORCE
8 AWG	8.5 mm ²	950 N
10 AWG	5.5 mm ²	650 N

Table 2. Pull-Out Force Table

NOTE: Mid-value clustering Method will be used if core cross-sectional area is not in the range of Table 2

IV. TREATMENT AFTER CRIMPING

Crimping tools, crimping mould should be removed from crimping machine and properly kept after crimping work.

11.2 INPUT CONNECTOR DATASHEET (DP5ZJW0300-001/DP5TJY0300-001)

- Material Code :
- Part Name: DP5ZJW0300-001 3pin PCB receptacle, DP5TJY0300-001 3 pin crimp plug
- Part Number: Receptacle (fix connector) DP5ZJW0300-001
 - Plug (moving connector) DP5TJY0300-001
- Information of environment protection: compliant with ROHS
- Technical Parameter Mated :
 - Electrical
 - o Current rating: 40 A at 55°C (accord with UL1977)
 - Withstanding voltage: 1500 V
 - ο Insulation Resistance ≥ 500 M Ω (Normal temperature); ≥ 100 M Ω (Damp Heat)
 - Hot plug function: Can meet the over load requirement of UL1977

Mechanical Characteristics

- Terminal type: receptacle PCB, plug crimp
- Service life: 250 cycles

Material and Surface Treatment

- o Contact material sockets: Copper alloy; pins: Copper
 - Surface Treatment : $0.2 \sim 0.6 \ \mu m$ gold plated over 1.27 μm nickel (or 5 um silver, up to customer requirement)
 - Housing material & processing
 - Material: glass fiber strengthened flameless PET UL94V-0
 - Color: black
 - Processing method: plastic injection

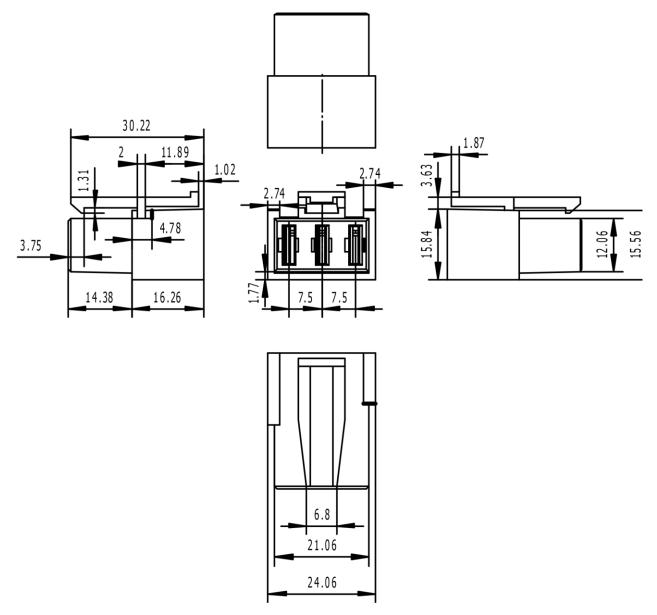
• Operating Environment

- o Range of temperature : -55°C∼125°C
- Humidity: 93% at 40°C
- o Shock acceleration 490 m/s2
- \circ $\,$ Vibration: 10Hz \sim 2000 Hz, acceleration: 98 m/s2 $\,$

• Dimensions of Product

o Dimension





Picture 8. Receptacle: DP5ZJW0300-001

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Bel Power Solutions:

PFE1100-12-054RD PFE1100-12-054ND PFE1100-12-054TD PFE1100-12-054SD