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POWERBOX
Parallel Connection with Current Share
Application Note

Description

This application note is created to assist on parallel connecting with accurate current share DC output power converters that doesn't have build in current share functionality. This current share circuit can virtually be applied for any converter that has DC output and remote sense function. The circuit is accomplished by utilizing Texas Instrument's load-share controller chip that measures the converter output current and adjusts the output by effecting the remote sense signal.

Parallel Operation

Two or more power converters are commonly connected in parallel to increase the total output current and thus the output power. Problem with parallel operation without current share function is that the converter with highest output voltage supplies full power causing it to run at higher temperature and potentially shorten the life on the converter or it can cause the converter to trip over current protection and therefore start oscillation with parallel connected converters. The current sharing function balances the output current evenly with the converters enabling them to run at same temperature and preventing them to trip over current protection. This circuit enables the current share at better than 1% deviation.

Redundant Operation

Parallel connecting several converters may also be needed to add N+1 redundancy to the system. The N+1 redundancy is use in high reliability systems which allows failure of one converter while rest of the converters keep the system running. This circuit can be utilized for redundant operation as well by adding ORing diodes to each converter output. A failing converter output is often shorted. This causes the current from other converters to drain through the failed converter tripping the over current protection on the functioning converters. The ORing diodes on each output prevents the current flowing in reverse direction through the failed converter. The current share circuit includes a fault protection which can be used to close failed converter from the current share signal.

Example Circuit

Below is a bill of materials for paralleling for example two PAE200W Series 12V output converters and on page 2 an example circuit. For paralleling other converters please refer to the newest Texas Instruments UCC29002 datasheet at ti.com or contact your nearest Powerbox sales office at prbx.com.

PAE200-□□S12W Load sharing reference list of materials

	Qty	Reference	Description	MFG	Part Number
Controller	2	U10,U20		TI	UCC29002
Resistor	1	R1	8.2KΩ,1/8W, ±1%,0805		
	1	R2	51Ω,1/8W, ±1%,0805		
	1	R3	180Ω,1/8W, ±1%,0805		
	2	R10,R20	2.5mΩ,2W,±1%,2512	VISHAY	WSL-2512
	2	R11, R21	510Ω,1/4W, ±1%,1206		
	4	R12,R14,R22,R24	100Ω,1/8W, ±1%,0805		
	4	R13,R15,R23,R25	4.32KΩ,1/8W, ±1%,0805		
	4	R16,R17, R26,R27	5.1KΩ,1/8W, ±1%,0805		
	2	R18, R28	1KΩ,1/8W, ±1%,0805		
	2	R19, R29	130Ω,1/8W, ±1%,0805		
Capacitor	3	C1,C10,C20	47µF,16V,X5R,MLCC	Murata	3
	2	C11,C21	1µF,25V,X7R,MLCC		2
	2	C12,C22	0.1µF,25V,X7R,MLCC		2
	4	C13,C14,C23,C24	1nF,50V,NPO,MLCC		4
	4	C15,C16,C25,C26	47µF,6.3V,X5R,MLCC		4
	2	C17,C27	10nF,50V,X7R,MLCC		2
Transistor	1	Q1	50V,2A,SOT-89	ROHM	2SC4672-Q
	2	Q10,Q20	50V,150mA,SOT-23	ROHM	2SC2412KR
Zener	1	ZD1	7.5V,5mA,SOD-323	ROHM	UDZS7.5B

PAE200-□□S12W Load sharing reference circuit