



# DFEC40 SERIES

CHASSIS-MOUNT DC-DC CONVERTER

2:1 WIDE INPUT RANGE  
UP TO 40 Watts



## FEATURES

- 1600VDC INPUT TO OUTPUT ISOLATION
- SCREW TERMINALS FOR INPUT AND OUTPUT CONNECTIONS
- RELIABLE SNAP-ON FOR DIN RAIL TS-35/7.5 OR TS-35/15
- CASE PROTECTION MEET IP20(IEC60529)
- INTERNAL OUTPUT DC-OK INDICATOR
- MEET EN55022 CLASS B
- SAFETY MEETS UL60950-1, EN60950-1, & IEC60950-1
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## APPLICATIONS

- COMMUNICATION SYSTEM
- INDUSTRY CONTROL SYSTEM
- FACTORY AUTOMATIC EQUIPMENT
- SEMICONDUCTOR EQUIPMENT

1600VDC ISOLATION	REMOTE CONTROL	UVP	OCP	SCP	OVP	FUSE INCLUDED	INRUSH LIMIT	REVERSE POLARITY PROTECTION
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## TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25°C otherwise noted

Model Number	Input Range	Output Voltage	Output Current @ Full Load		Input Current @ No Load	Efficiency	Maximum Capacitor Load (2)
	VDC	VDC	Min. Load (1) mA	Full Load mA	mA	%	µF
DFEC40-12S3P3	9.5 ~ 18	3.3	0	8000	179	84	21000
DFEC40-12S05	9.5 ~ 18	5	0	8000	232	84	13600
DFEC40-12S12	9.5 ~ 18	12	0	3333	262	84	2360
DFEC40-12S15	9.5 ~ 18	15	0	2666	320	85	1510
DFEC40-12S24	9.5 ~ 18	24	144	1800	42	83	600
DFEC40-12S28	9.5 ~ 18	28	122	1400	50	83	375
DFEC40-12D12	9.5 ~ 18	±12	±144	±1800	37	83	±1200
DFEC40-12D15	9.5 ~ 18	±15	±112	±1400	45	83	±750
DFEC40-12T3312	9.5 ~ 18	3.3 / ±12	600 / ±40	6000 / ±400	222	82	13000 / ±330
DFEC40-12T3315	9.5 ~ 18	3.3 / ±15	600 / ±30	6000 / ±300	237	82	13000 / ±110
DFEC40-12T0512	9.5 ~ 18	5 / ±12	600 / ±40	6000 / ±400	287	84	6800 / ±330
DFEC40-12T0515	9.5 ~ 18	5 / ±15	600 / ±30	6000 / ±300	287	84	6800 / ±110
DFEC40-24S3P3	18 ~ 36	3.3	0	8000	67	85	21000
DFEC40-24S05	18 ~ 36	5	0	8000	82	87	13600
DFEC40-24S12	18 ~ 36	12	0	3333	87	86	2360
DFEC40-24S15	18 ~ 36	15	0	2666	92	87	1510
DFEC40-24S24	18 ~ 36	24	144	1800	32	86	600
DFEC40-24S28	18 ~ 36	28	122	1400	32	86	375
DFEC40-24D12	18 ~ 36	±12	±144	±1800	27	85	±1200
DFEC40-24D15	18 ~ 36	±15	±112	±1400	27	85	±750
DFEC40-24T3312	18 ~ 36	3.3 / ±12	600 / ±40	6000 / ±400	67	83	13000 / ±330
DFEC40-24T3315	18 ~ 36	3.3 / ±15	600 / ±30	6000 / ±300	67	83	13000 / ±110
DFEC40-24T0512	18 ~ 36	5 / ±12	600 / ±40	6000 / ±400	67	85	6800 / ±330
DFEC40-24T0515	18 ~ 36	5 / ±15	600 / ±30	6000 / ±300	77	85	6800 / ±110
DFEC40-48S3P3	36 ~ 75	3.3	0	8000	42	86	21000
DFEC40-48S05	36 ~ 75	5	0	8000	44	88	13600
DFEC40-48S12	36 ~ 75	12	0	3333	54	87	2360
DFEC40-48S15	36 ~ 75	15	0	2666	57	87	1510
DFEC40-48S24	36 ~ 75	24	144	1800	23	86	600
DFEC40-48S28	36 ~ 75	28	122	1400	23	86	375
DFEC40-48D12	36 ~ 75	±12	±144	±1800	20	85	±1200
DFEC40-48D15	36 ~ 75	±15	±112	±1400	20	85	±750
DFEC40-48T3312	36 ~ 75	3.3 / ±12	600 / ±40	6000 / ±400	42	84	13000 / ±330
DFEC40-48T3315	36 ~ 75	3.3 / ±15	600 / ±30	6000 / ±300	42	84	13000 / ±110
DFEC40-48T0512	36 ~ 75	5 / ±12	600 / ±40	6000 / ±400	42	86	6800 / ±330
DFEC40-48T0515	36 ~ 75	5 / ±15	600 / ±30	6000 / ±300	47	86	6800 / ±110

**PART NUMBER STRUCTURE**

<b>DFEC40</b> -	<b>48</b>	<b>S</b>	<b>05</b>
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
	12: 9.5~18 24: 18~36 48: 36~75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 24: 24 28: 28
		D: Dual	12: ±12 15: ±15
		T: Triple	3312: 3.3 / ±12 3315: 3.3 / ±15 0512: 5 / ±12 0515: 5 / ±15

**INPUT SPECIFICATIONS**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin(nom)	9.5	12	18	VDC
	24Vin(nom)	18	24	36	
	48Vin(nom)	36	48	75	
Input fuse (slow blow)	12Vin(nom)		8		A
	24Vin(nom)		8		
	48Vin(nom)		4		
In-rush current			15		A
Input reflected ripple current	Nominal input and Full load		15		mAp-p
Start up voltage	12Vin(nom)			9.5	VDC
	24Vin(nom)			18	
	48Vin(nom)			36	
Shutdown voltage	12Vin(nom)		8		VDC
	24Vin(nom)		16		
	48Vin(nom)		33		
Start up time	Nominal input and Constant resistive load	Power up	100		ms
		Remote ON/OFF	25		
Input surge voltage	100ms, max.	12Vin(nom)		36	VDC
		24Vin(nom)		50	
		48Vin(nom)		100	
Remote ON/OFF	Referred to -Vin pin	Positive logic DC-DC ON	Open or 3.5 ~ 12VDC		mA
		DC-DC OFF	Short or 0 ~ 1.2VDC		
		Input current of Ctrl pin	-0.5	0.5	
		Remote off input current	2.5		mA

**OUTPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit	
Voltage accuracy	3.3Vout		-2.0		+2.0	%	
	Single / Dual		-1.5		+1.5		
	Triple: 3.3Vout, 5Vout		-2.0		+2.0		
	Triple: 12Vout, 15Vout		-5.0		+5.0		
Line regulation	Low Line to High Line at Full Load		Single / Dual		-0.5	+0.5	%
			Triple: 3.3Vout, 5Vout		-1.0	+1.0	
			Triple: 12Vout, 15Vout		-5.0	+5.0	
Load regulation	Min. Load to Full Load  Triple: Main output: (3.3Vout, 5Vout) 10% to 100% with 10% to 100% balanced on auxiliaries. Auxiliary outputs 10% to 100% balanced on all outputs.		3.3Vout		-2.0	+2.0	%
			Single / Dual		-1.5	+1.5	
			Triple: 3.3Vout, 5Vout		-2.5	+2.5	
			Triple: 12Vout, 15Vout		-5.0	+5.0	
Cross regulation	Dual: Asymmetrical load 25%/100% FL Triple: Main output:(3.3Vout, 5Vout) 100% load, auxiliary 100%, other auxiliary 25% to 100% load or main output:(3.3Vout, 5Vout) 25%, auxiliary 25%, other auxiliary 25% to 100%.		Dual		-5.0	+5.0	%
			Triple: 3.3Vout, 5Vout		-2.5	+2.5	
			Triple: 12Vout, 15Vout		-5.0	+5.0	
Voltage adjustability	Single output	28Vout Others	-3 -10		+17 +10	%	
Ripple and noise	Measured by 20MHz bandwidth	Single / Triple: Main	3.3Vout, 5Vout		50	mVp-p	
		Single / Triple: Auxiliary	12Vout, 15Vout		75		
		Single	24Vout, 28Vout		350		
		Dual	12Vout		120		
			15Vout		150		
Temperature coefficient			-0.02		+0.02	%/°C	
Transient response recovery time	25% load step change			250		µs	
Over voltage protection	Zener diode clamp		3.3Vout			3.9	VDC
			5Vout			6.2	
			12Vout			15	
			15Vout			18	
			24Vout			30	
			28Vout			36	
Output indicator			Green LED				
Over load protection	% of Iout rated; Hiccup mode					150 %	
Short circuit protection						Continuous, automatic recovery	

**GENERAL SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	1600			VDC
		Input (Output) to Chassis	1600			
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					4000	pF
Switching frequency			270	300	330	kHz
Safety meets						UL60950-1 EN60950-1 IEC60950-1
Chassis material						Aluminum
Weight						182g (6.40oz)
MTBF	MIL-HDBK-217F, Full load					8.080 x 10 <sup>5</sup> hrs

**ENVIRONMENTAL SPECIFICATIONS**

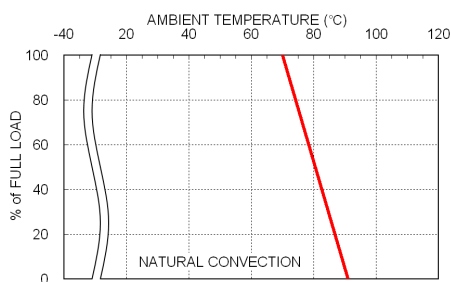
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating		-40		+58	°C
	With derating		+58		+86	
Storage temperature range			-40		+105	°C
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

**EMC SPECIFICATIONS**

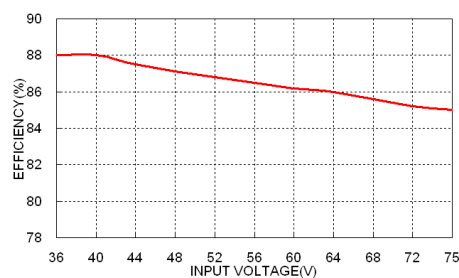
Parameter	Conditions		Level
EMI	EN55022		Class B
ESD	EN61000-4-2	Air $\pm 8$ kV and Contact $\pm 6$ kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2$ kV	Perf. Criteria A
Surge	EN61000-4-5	$\pm 1$ kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

**Note:**

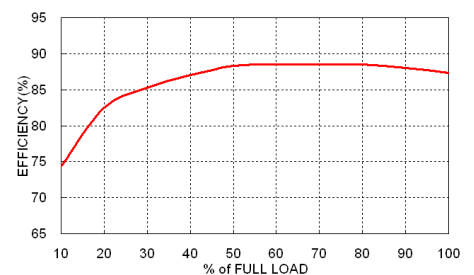
- The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
- Test by minimum input and constant resistive load.

**CHARACTERISTIC CURVE**


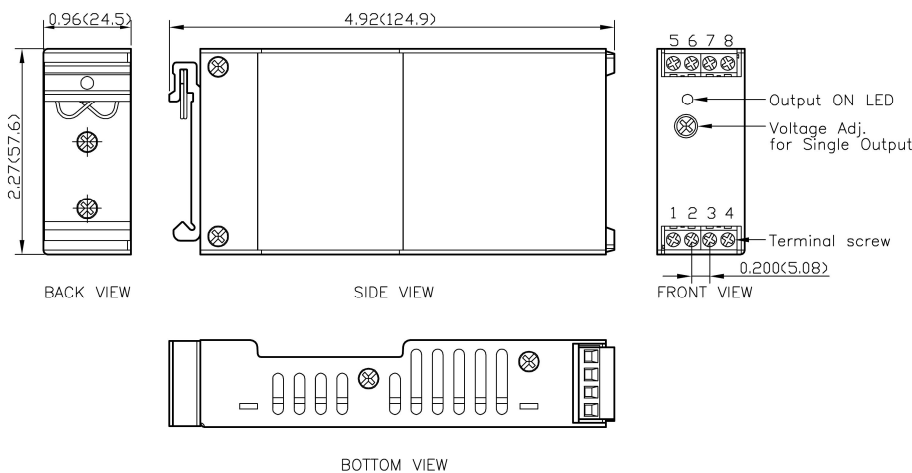
DFEC40-48S05 Derating Curve



DFEC40-48S05 Efficiency vs. Input Voltage



DFEC40-48S05 Efficiency vs. Output Load

**MECHANICAL DRAWING**

**PIN CONNECTION**

PIN	SINGLE	DUAL	TRIPLE
1	Ctrl	Ctrl	Ctrl
2	-Vin	-Vin	-Vin
3	-Vin	-Vin	-Vin
4	+Vin	+Vin	+Vin
5	NC	NC	+Aux
6	-Vout	-Vout	Common
7	+Vout	Common	-Aux
8	NC	+Vout	+Vout

\* NC : No Connection

 \* Screw terminals –  
wire range from 14 to 18 AWG

- All dimensions in Inch (mm)
- Tolerance : X.XX $\pm$ 0.02 (X.X $\pm$ 0.5)  
X.XXX $\pm$ 0.01 (X.XX $\pm$ 0.25)
- Terminal screw locked torque :  
MAX 2.5kgf-cm (0.25N-m)