



APPLICATIONS

Communication System
Industry Control System
Factory Automatic Equipment
Semiconductor Equipment

FEATURES

- DIN RAIL DC/DC CONVERTERS
- 40 WATTS MAXIMUM OUTPUT POWER
- OFFER SINGLE AND DUAL OUTPUT
- OVERLOAD AND SHORT CIRCUIT PROTECTION
- OVER VOLTAGE PROTECTION
- RELIABLE SNAP-ON FOR DIN RAIL TS-35/7.5 OR TS-35/15
- I/O-ISOLATION 1600 VDC
- CASE PROTECTION MEET IP20(IEC60529)
- INTERNAL INPUT FUSE PROTECTION
- INTERNAL INPUT REVERSAL POLARITY PROTECTION
- INTERNAL INPUT IN-RUSH CURRENT LIMIT CIRCUIT
- INTERNAL OUTPUT DC-OK INDICATOR
- MEET EN55022 CLASS B
- COMPLIANT TO RoHS EU DIRECTIVE 2011/65/EU

DESCRIPTION

The DFEC40 series was designed to easy application of din rail DC-DC converters. Easy installation is provided with snap-on mounting on the DIN-rail. Internal protection circuits such as input reversal and in-rush current limit protection, as well as output short-circuit and over-voltage protection. A green LED at the front displays the status of the output(s).

TECHNICAL SPECIFICATION

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

OUTPUT SPECIFICATIONS			
Output power		40 Watts, max	
Voltage accuracy	3.3Vout	± 2%	
	Single / Dual	± 1.5%	
	Triple Main	± 2%	
	Triple Auxiliary	± 5%	
Minimum load (Note 6)		See table	
Voltage adjustability (Note 7)	Single 28Vout	-3% ~ +17%	
	Single Others	± 10%	
Line regulation	LL to HL at Full load	Single/Dual	± 0.5%
		Triple Main	± 1%
		Triple Auxiliary	± 5%
			± 5%
Load regulation (Note 8)	Min. load to Full load	3.3Vout	± 2%
		Single / Dual	± 1.5%
		Triple Main	± 2.5%
		Triple Auxiliary	± 5%
Load cross regulation(Note 9)	Triple Main	± 2.5%	
	Dual/ Triple Auxiliary	± 5%	
Ripple and noise	20MHz bandwidth	See table	
Temperature coefficient		±0.02% / °C, max.	
Transient response recovery time	25% load step change	250µs	
Over voltage protection Zener diode clamp	3.3VDC output	3.9VDC	
	5VDC output	6.2VDC	
	12VDC output	15VDC	
	15VDC output	18VDC	
	24VDC output	30VDC	
	28VDC output	36VDC	
Output indicator		Green LED	
Over load protection	% of FL at nominal input	150%, max.	
Short circuit protection		Continuous, automatic recovery	

GENERAL SPECIFICATIONS			
Efficiency		See table	
Isolation voltage	Input to Output	1600VDC, min. 1minute	
	Input(Output) to Chassis	1600VDC, min. 1minute	
Isolation resistance	500VDC	10 ⁹ ohms, min.	
Isolation capacitance		4000pF, max.	
Switching frequency		300kHz±10%	
Design meets safety standard	IEC60950-1, UL60950-1, EN60950-1		
Chassis material		Aluminum	
Dimensions		4.92 X 2.27 X 0.97 Inch (125.0 X 57.6 X 24.5 mm)	
Weight		182g (6.40oz)	
MTBF (Note 1)	MIL-HDBK-217F	8.080 x 10 ⁵ hrs	

INPUT SPECIFICATIONS			
Input voltage range	12VDC nominal input	9.5 ~ 18VDC	
	24VDC nominal input	18 ~ 36VDC	
	48VDC nominal input	36 ~ 75VDC	
Input surge voltage	12VDC input	36VDC 100ms, max.	
	24VDC input	50VDC 100ms, max.	
	48VDC input	100VDC 100ms, max.	
Input fuse (slow blow)	12VDC input	8A	
	24VDC input	8A	
	48VDC input	4A	
In-rush current		15A	
Input reflected ripple current		15mA _{p-p}	
Start up time	Nominal input and constant resistive load	Power up	100ms
		Remote ON/OFF	25ms
Start-up voltage	12VDC input	9.5VDC	
	24VDC input	18VDC	
	48VDC input	36VDC	
Shutdown voltage	12VDC input	8VDC	
	24VDC input	16VDC	
	48VDC input	33VDC	
Remote ON/OFF (Note 10)			
(Positive logic) (Standard)	DC-DC ON	Open or 3.5 V < Vr < 12V	
	DC-DC OFF	Short or 0V < Vr < 1.2V	
Input current of Remote control pin	Nominal input	-0.5mA ~ + 0.5mA	
Remote off state input current	Nominal input	2.5mA	

ENVIRONMENTAL SPECIFICATIONS			
Operating ambient temperature		-40°C ~ +58°C (without derating)	
		+58°C ~ +86°C (with derating)	
Storage temperature range		-40°C ~ +105°C	
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

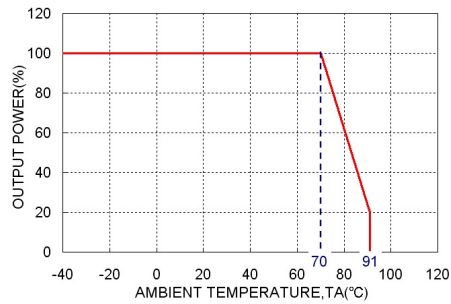
EMC CHARACTERISTICS			
EMI	EN55022		Class B
ESD	EN61000-4-2	Air Contact	± 8kV
			± 6kV
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
Surge	EN61000-4-5	± 1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A

Model Number	Input Range	Output Voltage	Output Current		Output Ripple & Noise ⁽²⁾	No Load ⁽³⁾ Input Current	Eff ⁽⁴⁾ (%)	Capacitor ⁽⁵⁾ Load max
			Min. load	Full load				
DFEC40-12S3P3	9.5 ~ 18 VDC	3.3 VDC	0mA	8000mA	50mVp-p	179mA	84	21000μF
DFEC40-12S05	9.5 ~ 18 VDC	5 VDC	0mA	8000mA	50mVp-p	232mA	84	13600μF
DFEC40-12S12	9.5 ~ 18 VDC	12 VDC	0mA	3333mA	75mVp-p	262mA	84	2360μF
DFEC40-12S15	9.5 ~ 18 VDC	15 VDC	0mA	2666mA	75mVp-p	320mA	85	1510μF
DFEC40-12S24	9.5 ~ 18 VDC	24 VDC	0mA	1800mA	350mVp-p	42mA	83	600μF
DFEC40-12S28	9.5 ~ 18 VDC	28 VDC	0mA	1400mA	350mVp-p	50mA	83	375μF
DFEC40-12D12	9.5 ~ 18 VDC	± 12 VDC	0mA	± 1800mA	120mVp-p	37mA	83	± 1200μF
DFEC40-12D15	9.5 ~ 18 VDC	± 15 VDC	0mA	± 1400mA	150mVp-p	45mA	83	± 750μF
DFEC40-12T3312	9.5 ~ 18 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	222mA	82	13000 / ±330μF
DFEC40-12T3315	9.5 ~ 18 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	237mA	82	13000 / ±110μF
DFEC40-12T0512	9.5 ~ 18 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	287mA	84	6800 / ±330μF
DFEC40-12T0515	9.5 ~ 18 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	287mA	84	6800 / ±110μF
DFEC40-24S3P3	18 ~ 36 VDC	3.3 VDC	0mA	8000mA	50mVp-p	67mA	85	21000μF
DFEC40-24S05	18 ~ 36 VDC	5 VDC	0mA	8000mA	50mVp-p	82mA	87	13600μF
DFEC40-24S12	18 ~ 36 VDC	12 VDC	0mA	3333mA	75mVp-p	87mA	86	2360μF
DFEC40-24S15	18 ~ 36 VDC	15 VDC	0mA	2666mA	75mVp-p	92mA	87	1510μF
DFEC40-24S24	18 ~ 36 VDC	24 VDC	0mA	1800mA	350mVp-p	32mA	86	600μF
DFEC40-24S28	18 ~ 36 VDC	28 VDC	0mA	1400mA	350mVp-p	32mA	86	375μF
DFEC40-24D12	18 ~ 36 VDC	± 12 VDC	0mA	± 1800mA	120mVp-p	27mA	85	± 1200μF
DFEC40-24D15	18 ~ 36 VDC	± 15 VDC	0mA	± 1400mA	150mVp-p	27mA	85	± 750μF
DFEC40-24T3312	18 ~ 36 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	67mA	83	13000 / ±330μF
DFEC40-24T3315	18 ~ 36 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	67mA	83	13000 / ±110μF
DFEC40-24T0512	18 ~ 36 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	67mA	85	6800 / ±330μF
DFEC40-24T0515	18 ~ 36 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	77mA	85	6800 / ±110μF
DFEC40-48S3P3	36 ~ 75 VDC	3.3 VDC	0mA	8000mA	50mVp-p	42mA	86	21000μF
DFEC40-48S05	36 ~ 75 VDC	5 VDC	0mA	8000mA	50mVp-p	44mA	88	13600μF
DFEC40-48S12	36 ~ 75 VDC	12 VDC	0mA	3333mA	75mVp-p	54mA	87	2360μF
DFEC40-48S15	36 ~ 75 VDC	15 VDC	0mA	2666mA	75mVp-p	57mA	87	1510μF
DFEC40-48S24	36 ~ 75 VDC	24 VDC	0mA	1800mA	350mVp-p	23mA	86	600μF
DFEC40-48S28	36 ~ 75 VDC	28 VDC	0mA	1400mA	350mVp-p	23mA	86	375μF
DFEC40-48D12	36 ~ 75 VDC	± 12 VDC	0mA	± 1800mA	120mVp-p	20mA	85	± 1200μF
DFEC40-48D15	36 ~ 75 VDC	± 15 VDC	0mA	± 1400mA	150mVp-p	20mA	85	± 750μF
DFEC40-48T3312	36 ~ 75 VDC	3.3 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	42mA	84	13000 / ±330μF
DFEC40-48T3315	36 ~ 75 VDC	3.3 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	42mA	84	13000 / ±110μF
DFEC40-48T0512	36 ~ 75 VDC	5 / ±12 VDC	600mA / ±40mA	6000mA / ±400mA	50 / 75mVp-p	42mA	86	6800 / ±330μF
DFEC40-48T0515	36 ~ 75 VDC	5 / ±15 VDC	600mA / ±30mA	6000mA / ±300mA	50 / 75mVp-p	47mA	86	6800 / ±110μF

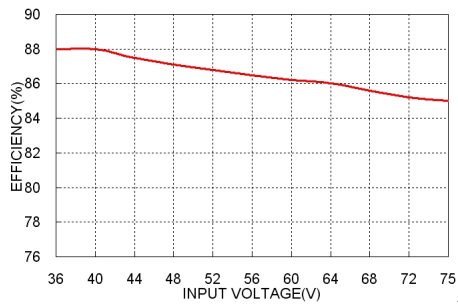
Note

- MIL-HDBK-217F @Ta=25 °C, Full load.
- Typical value at nominal input and full load. (20MHz BW.)
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- Test by minimum input and constant resistive load.
- The output requires minimum loading on the output to maintain specified regulation. Operation in no-load condition will not damage these devices, however they may not meet all listed specification.
- Single output installs a potentiometer to adjust the output voltage.
- Load regulation for triple output:
Main output(V1):10% to 100% with 10% to 100% balanced on auxiliaries.
Auxiliary outputs(V2 and V3):10% to 100% balanced on all outputs.
- Cross regulation for dual output: asymmetrical load 25% / 100% FL.
Cross regulation for triple output:
Main output 100% load, auxiliary 100%, other auxiliary 25% to 100%.
Auxiliary outputs(V2 and V3):main output 100% load, auxiliary 100%, other auxiliary 25% to 100% or main output 25%, auxiliary 25%, other auxiliary 25% to 100%.
- The ON/OFF control pin voltage is referenced to -INPUT.

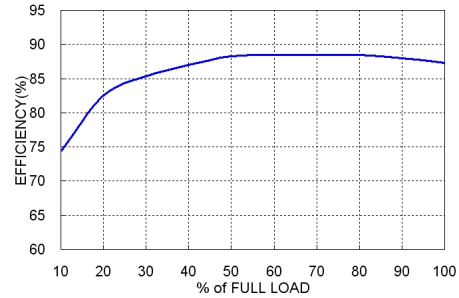
DFEC40-48S05 Derating Curve



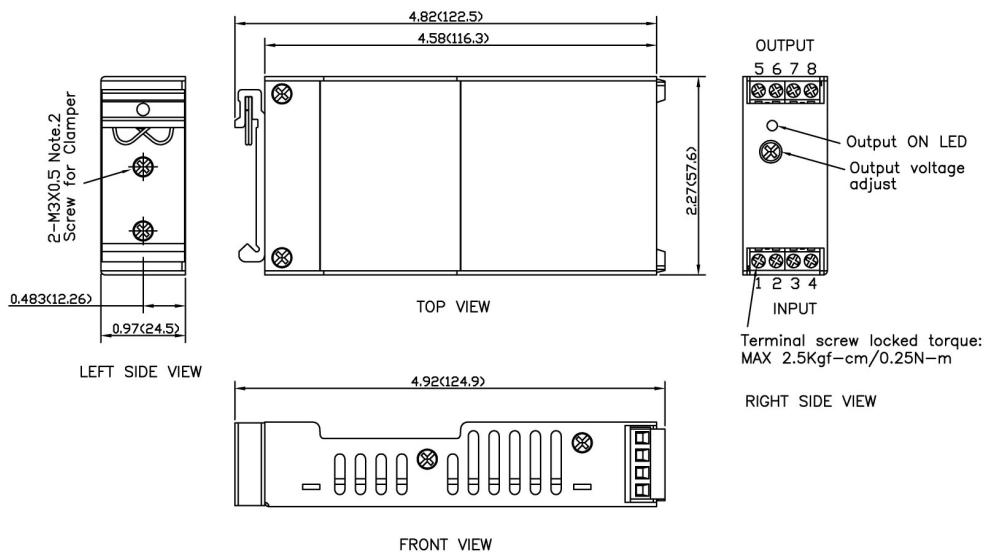
DFEC40-48S05 Efficiency VS Input Voltage



DFEC40-48S05 Efficiency VS Output Current



MECHANICAL DRAWING :



Note: 1.All dimensions in inch(mm)
Tolerance : x.xx±0.02(x.x±0.5)
x.xxx±0.01(x.xx±0.25)
2.The screw locked torque: MAX 5.0kgf-cm/0.49N-m

PIN CONNECTION			
PIN	SINGLE	DUAL	TRIPLE
1	CTRL	CTRL	CTRL
2	-INPUT	-INPUT	-INPUT
3	-INPUT	-INPUT	-INPUT
4	+INPUT	+INPUT	+INPUT
5	NC	NC	+AUXILIARY
6	-OUTPUT	-OUTPUT	COMMON
7	+OUTPUT	COMMON	-AUXILIARY
8	NC	+OUTPUT	+OUTPUT

※ NC : No Connection

※ Screw terminals – wire range from 14 to 18 AWG