KUL ELEKTRONIK SANAYI TIC LTD STI

28V Military Grade KEPS50 Series

28V_{IN}, 3.3 to 15V_{OUT} Isolated Power Converter Module Family

Product Information

KEPS50 series converters can transfer 282W power in a very low volume of 2.90cm^3 (0.177in^3).

It can transfer up to 50W power to its output in a wide input range of 18-50V.

It provides 50% space saving compared to its competitors with its suitability for surface mount soldering.

The output voltage is controlled precisely and continuously in an isolated manner from the primary side. Its ability to operate even at very low temperatures makes it suitable for use in the aviation sector.

KEPS50 series converters are offered to the market with 4 different output voltages in the 18-50V input voltage range. These are;

Device	Output Voltage		I_{OUT}Max
	Set	Range	
KEPS50330	3.40V	3.0-3.4V	10A
KEPS50500	5.25V	4.5-5.25V	10A
KEPS50120	12.36V	11-12.36V	4.2A
KEPS50150	15.45V	14-16.5V	3.3A

Specifications

- Efficiency up to %88
- Isolated output (3.3V, 5V 12V and 15V)
- Small footprint area (3.63cm^2)
- Very low profile (8mm)
- On/Off control, positive logic
- Wide input voltage range operation (18-50V_{DC})
- Wide trim range -10/+10% All models
- Temperature monitor (TM)/Overtemperature Protection (OTP)
- Input OVLO &UVLO
- Overcurrent protection with auto restart
- 2250V_{DC} input output isolation

Applications

- Wide temperature environments
- Military applications
- Board level isolated power conversion

Package Information

- Surface mountable 22x16.5x8.2mm
- Weight : 10 grams

Contents

Order Informations

Part Number	V_{IN}	V_{OUT}	I_{OUT}MAX	Dimensions	Package
KEPS50330	18-48V	3.3V	10A	16.5x22x8.4mm	TRAY
KEPS50500	18-48V	5V	8A	16.5x22x8.4mm	TRAY
KEPS50120	18-48V	12V	3.5A	16.5x22x8.4mm	TRAY
KEPS50150	18-48V	15V	3.2A	16.5x22x8.4mm	TRAY

Absolute Maximum Ratings

Name	Rating
+IN to -IN Max Operating Voltage	+50V_{DC}
+IN to -IN Max Peak Voltage	+53V_{DC} (non operating)
ENABLE to -IN	-0.32 to 6V_{DC}
TM to -IN	-0.32 to 6V_{DC}
TRIM to -IN	-0.32 to 6V_{DC}
+OUT to -OUT	See revelant model to output section
Isolation Voltage (Input to Output)	2250V_{DC}
Continuous Output Current	See revelant model to output section
Peak Output Current	See revelant model to output section
Operating Junction Tenperature	-55°C to 125°C
Storage Temperature	-65°C to 125°C
Case Temperature During Reflow	228°C

Pin Description

+IN	Primary side positive input voltage terminals
-IN	Primary side negative input voltage terminals
ENABLE	Converter enable option, functions as 5V reference and on / off control pin. Pull low for off
TRIM	Connect to SGND through resistor for trim down
TM	Temperature measurement output pin.
SGND	Signal ground, primary side referenced
+OUT	Isolated secondary DC output voltage positive terminals
-OUT	Isolated secondary DC output voltage negative terminals

Package Pinout

KEPS50330 Electrical Characteristics

Unless otherwise specified: 18V < V_{IN} <50V, 0A < I_{OUT} < 10A, -55°C <T_{CASE} < 100°C

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Input Specifications						
Input Voltage Range	V_{IN}		18	28	50	V_{DC}
Input dV/dt	V_{INDVDT}	V_{IN}=50V			1	V/µS
Input Undervoltage Turn-on	V_{UVON}	I_O=10A	15.4	16.3	17.1	V_{DC}
Input Undervoltage Turn-off	V_{UVOFF}	I_O=10A	14.9	15.8	16.6	V_{DC}
Input Undervoltage hysteresis	V_{UVH}	I_O=10A		0.5		V_{DC}
Input Overvoltage Turn-on	V_{OVON}	I_O=10A	47.3	48.4	49.6	V_{DC}
Input Overvoltage Turn-off	V_{OVOFF}	I_O=10A	48.6	49.8	51	V_{DC}
Input Overvoltage hysteresis	V_{OVH}	I_O=10A		1.4		V_{DC}
Input Quiescent Current	I_Q	V_{IN}=28V, ENABLE=0V				mApp
Input Idling Power	P_{IDLE}	V_{IN}=28V, I_O=10A				W
Input Standby Power	P_{SBY}	V_{IN}=28V, ENABLE=0V				W
Input Current Full Load	I_{IN}	T_{CASE}=100°C, I_O=10A, η=86%typical, V_{IN}=28V				A_{DC}
Input Reflected Ripple Voltage	I_{INRR}	L_{IN}=0.47uH, C_{IN}=100µF 63V electrolytic, + 2x4.7µF 50V X7R				mApp
Recommended Ext Input Cap.	C_{IN}	100µF 63V electrolytic, + 2x4.7µF 50V X7R		109.4		µF
Output Specifications						
Output Voltage Set Point	V_{OUT}	I_{OUT}=5A		3.3		V_{DC}
Total Output Accurary	V_{OA}	0°C <T_{CASE} < 100°C	-3		+3	%
		-55°C <T_{CASE} < 0°C	-5		+3	%
Output Voltage Trim Range	V_{OADJ}				+10	%
Output Current Range	I_{OUT}				10	A_{DC}
Overcurrent Protection	I_{OCP}		11	14	17	A_{DC}
Efficieny - Full Load	η_{FL}	T_{CASE} = 100°C, V_{IN}=28V		82		%
Efficieny - Half Load	η_{HL}	T_{CASE} = 100°C, V_{IN}=28V	80			%
Output OVP Setpoint	V_{OVP}	Continuous Control				V_{DC}
Output Ripple Voltage	V_{ORPP}	C_{OUT}=6x10 µF 10V X7R DC-20MHz		105		mV_{PP}
Switching Frequency	f_{SW}			500		kHz
Output Turn On Delay time	t_{ONDLY}	V_{IN}= V_{UVON} to ENABLE=5V; V_{IN} rise time <1ms		40		ms
Output Turn Off Delay time	t_{OFFDLY}	V_{IN}= V_{UVOFF} V_{UVON} to ENABLE < 2.35V		300		µS
Soft Start Ramp Time	t_{SS}			300		µS
Maximum Load Capacitance	C_{OUT}	C_{OUT} =Al electrolytic		2200		µF
Load Transient Deviation	V_{ODV}	I_{OUT}=%50 step 0.1A/µS C_{OUT}=6x10 µF 10V X7R		150		mV
Load Transient Recovery Time	T_{OVR}	I_{OUT}=%50 step 0.1A/µS C_{OUT}=6x10 µF 10V X7R V_{OUT}≤%1		200		µS
Maximum Output Power	P_{OUT}			33		W

Absolute Maximum Output Ratings	
Name	**Ratings**
+OUT to -OUT	0 to $6V_{DC}$
Continuous Output Current	$10A_{DC}$
Peak Output Current	$17A_{DC}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
ENABLE PIN						
DC Voltage reference Output	V_{ERO}		4.9	5	5.1	V_{DC}
Output Current Limit	I_{ECL}			-2.6		mA_{DC}
Startup CUrrent Limit	I_{ESL}			-90		μA_{DC}
Module Enable Voltage	V_{EME}		2.53			V_{DC}
Module Disable Voltage	V_{EMD}				2.47	V_{DC}
Disable Hysteresis	V_{EDH}			600		mV
Enable Delay Time	t_{ED}			10		µS
Disable Delay Time	t_{DD}			10		µS
Maximum Capacitance	C_{EC}			1500		pF
Maximum external Toggle Time	f_{EXT}			1		Hz
TRIM PIN						
Trim VOltage Reference	V_{REF}		1.22	1.25	1.27	V_{DC}
Internal Capacitance	C_{REFI}			10		nF
External Capacitance	C_{REF}				0.22	µF
Internal Resistance	R_{REFI}			8.2		kΩ
TM(Temperature Monitor)						
Temperature Coefficient	TM_{TC}			10		mV/°K
Temperature Full Range Accurary	TM_{ACC}		-5		5	°K
Drive Capability	I_{TM}			1		mA
TM Outpt Setting	V_{TM}	Ambient temperature 273°K		2.73		V
Thermal Specification						
Junction Temperature Shutdown	T_{MAX}		125	129	135	°C
Junction to Case Thermal Impedance	θ_{J-C}			3		°C/W
Junction to Ambient Thermal Impedance	θ_{J-A}			12		°C/W
Soldering						
Recommended Soldering Temperature					230	°C
Peak Temperature During Reflow					245	°C

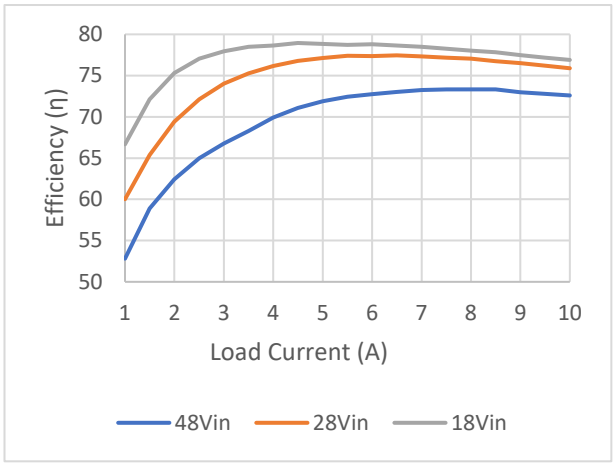

Figure 1: Conversion Efficiency

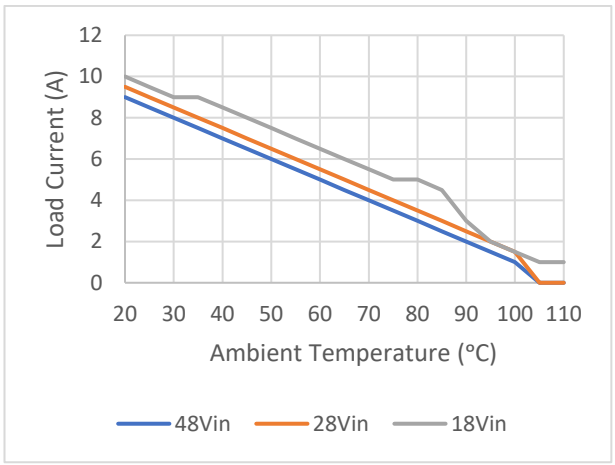

Figure 2: Load current vs Ambient Temp (Without Heatsink)

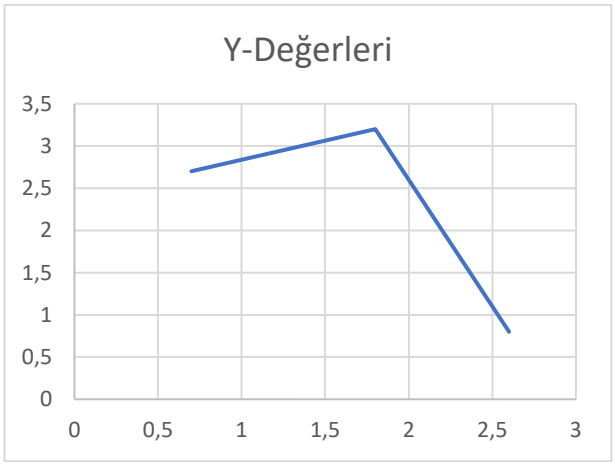

Figure 3: Load current vs Ambient Temp (With 6.33mm Heatsink)

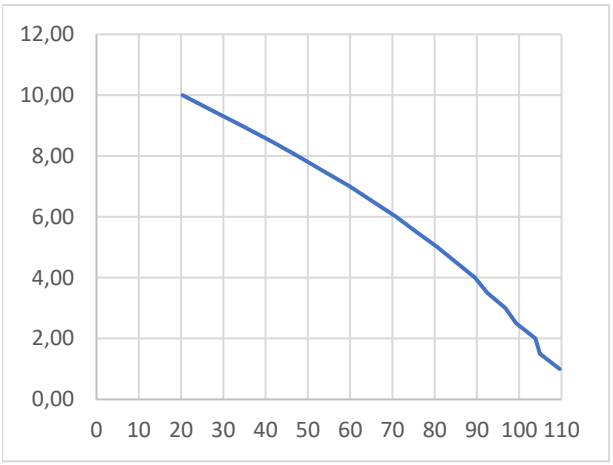

Figure 4: Load current vs Ambient Temp (With 11mm Heatsink)

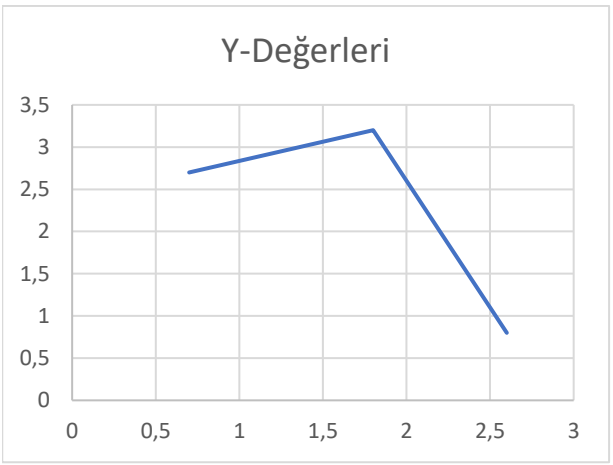

Figure 5: Start up, VIN=16V, IOUT=10A, COUT 6x10uF X7R Ceramic

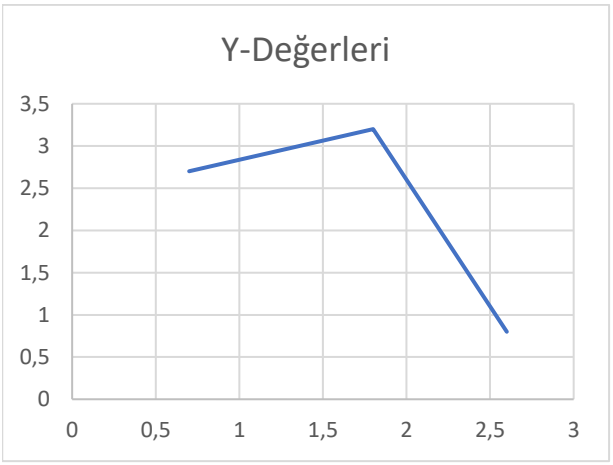

Figure 6 :Start up, VIN=28V, IOUT=10A, COUT 6x10uF X7R Ceramic

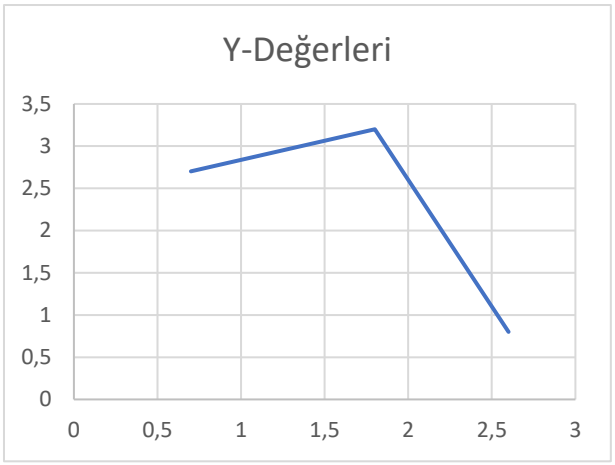

Figure 7 ::Start up, VIN=50V, IOUT=10A, COUT 6x10uF X7R Ceramic

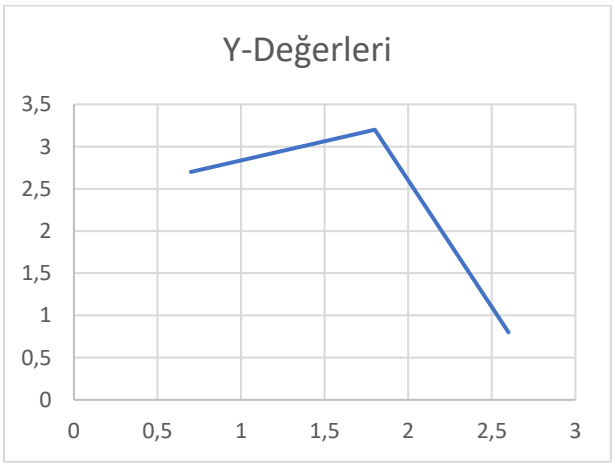

Figure 8 :Transient Response (VIN=28V, IOUT= 5-10A, 0.1A/us, COUT=6x10uF X7R Ceramic)

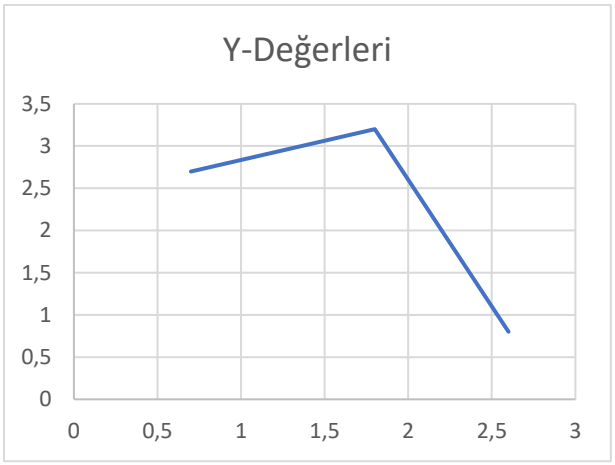

Figure 9 :Output ripple (VIN=28V, IOUT=10A, CR,COUT=6x10uF X7R Ceramic)