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 are high power density isolated DC/DC converter that can operate in wide input voltages (18-48VDC) and military temperature grade(-55°C +125°C). It provides up to %50 space saving because of 268W/in^3 power density.

It can operate at input 18-48VDC and can deliver up to 50W and 2250V isolated power to its output. It SMD pins to achive maximum space saving.

The output voltage is continuously controlled with a 4µS refresh rate from primary side. It can operate at -55°C +125°C environmet condition and is suitable for military and space applications.

It has output voltage trim capability, overcurrent protection with auto-restart, under and over input voltage lockout, Kelvin or Celcius temperature monitoring and protection functions.

KEPS50 series has 4 different output voltage and power option:

Device	Output Voltage		I_{OUT}Max
	Set	Range	
KEPS50330	3.30V	3.30-3.4V	10A
KEPS50500	5.00V	5-5.25V	8A
KEPS50120	12.0V	12-12.36V	3.3A
KEPS50150	15.0V	15-16.5V	2.66A

Specifications

- Efficiency up to %86
- Isolated output (3.3V, 5V 12V and 15V)
- Small footprint area (3.63cm^2)
- Very low profile (8.4mm)
- On/Off control, positive logic
- Wide input voltage range operation (18-48V_{DC})
- +10% trim range All models
- Kelvin or Degree Temperature monitor (TM)/Overtemperature Protection (OTP)
- Input OVLO &UVLO
- Overcurrent protection with auto restart
- Continious Output Voltage Control
- 2250V_{DC} input output isolation

Applications

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

Package Information

- Surface mountable 22x16.5x8.4mm
- 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	2.66A	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

KEPS50150 Electrical Characteristics

Unless otherwise specified: 18V < V_{IN} <48V, 0A < I_{OUT} < 8A, -55°C <T_{CASE} < 100°C

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Input Specifications						
Input Voltage Range	V_{IN}		17.5	28	48	V_{DC}
Input dV/dt	V_{INDVDT}	V_{IN}=50V			1	V/µS
Input Undervoltage Turn-on	V_{UVON}	I_O=2.66A	17.30	17.38	17.48	V_{DC}
Input Undervoltage Turn-off	V_{UVOFF}	I_O=2.66A	16.92	17.02	17.12	V_{DC}
Input Undervoltage hysteresis	V_{UVH}	I_O=2.66A		0.1		V_{DC}
Input Overvoltage Turn-on	V_{OVON}	I_O=2.66A	48.12	48.22	48.32	V_{DC}
Input Overvoltage Turn-off	V_{OVOFF}	I_O=2.66A	48.61	48.71	48.81	V_{DC}
Input Overvoltage hysteresis	V_{OVH}	I_O=2.66A		0.1		V_{DC}
Input Quiescent Current	I_Q	V_{IN}=28V, ENABLE=0V		3		mApp
Input Idling Power	P_{IDLE}	V_{IN}=28V, I_O=0A		1,008		W
Input Standby Power	P_{SBY}	V_{IN}=28V, ENABLE=0V		0,084		W
Input Current Full Load	I_{IN}	T_{CASE}=100°C, I_O=10A, η=86%typical, V_{IN}=28V		1,586		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}=2,66A		15		V_{DC}
Total Output Accurary	V_{OA}	0°C <T_{CASE} < 100°C	-3		3	%
		-55°C <T_{CASE} < 0°C	-3		3	%
Output Voltage Trim Range	V_{OADJ}				10	%
Output Current Range	I_{OUT}			2,66		A_{DC}
Overcurrent Protection	I_{OCP}			3,3		A_{DC}
Efficieny - Full Load	η_{FL}	T_{CASE} = 100°C, V_{IN}=28V		84,5		%
Efficieny - Half Load	η_{HL}	T_{CASE} = 100°C, V_{IN}=28V		81,5		%
Output OVP Setpoint	V_{OVP}	Continuous Control				V_{DC}
Output Ripple Voltage	V_{ORPP}	NO External Capacitor DC-20MHz		300		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		50		ms
Output Turn Off Delay time	t_{OFFDLY}	V_{IN}= V_{UVOFF} V_{UVON} to ENABLE < 2.35V		100		µS
Soft Start Ramp Time	t_{SS}			20		mS
Maximum Load Capacitance	C_{OUT}	C_{OUT} =Al electrolytic				µF
Load Transient Deviation	V_{ODV}	I_{OUT}=%50 step 0.1A/µS		500		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}			40		W

Absolute Maximum Output Ratings	
Name	**Ratings**
+OUT to -OUT	0 to $6V_{DC}$
Continuous Output Current	$2,66A_{DC}$
Peak Output Current	$3,3A_{DC}$

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}			-5		mA_{DC}
Startup Current Limit	I_{ESL}			-500		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}					µF
External Capacitance	C_{REF}					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}			2.3		°C/W
Junction to Ambient Thermal Impedance	θ_{J-A}	Without Copper plate		19		°C/W
Soldering						
Recommended Soldering Temperature					230	°C
Peak Temperature During Reflow						°C

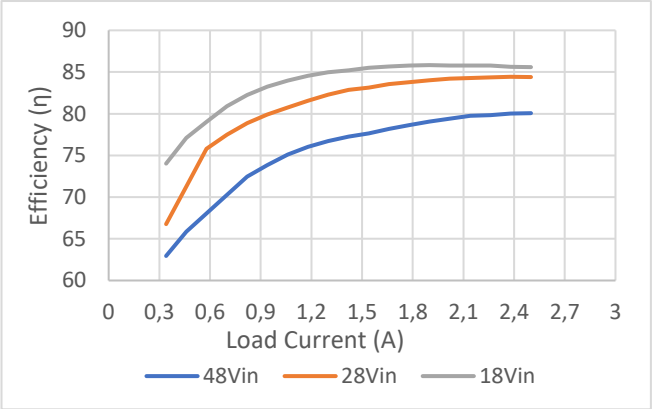

Figure 1 :Conversion Efficiency

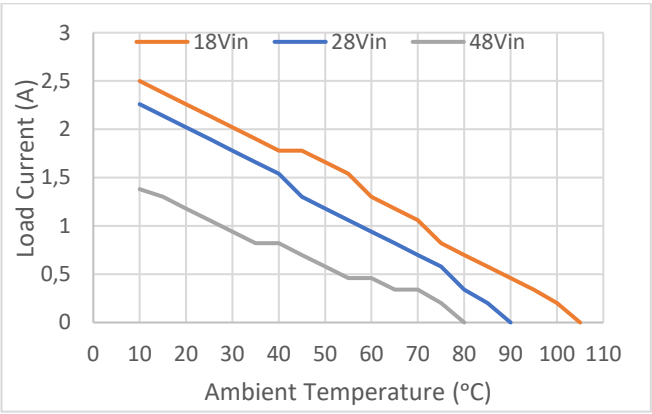

Figure 2 : Load current vs Ambient Temp (Without Heatsink and cooler)

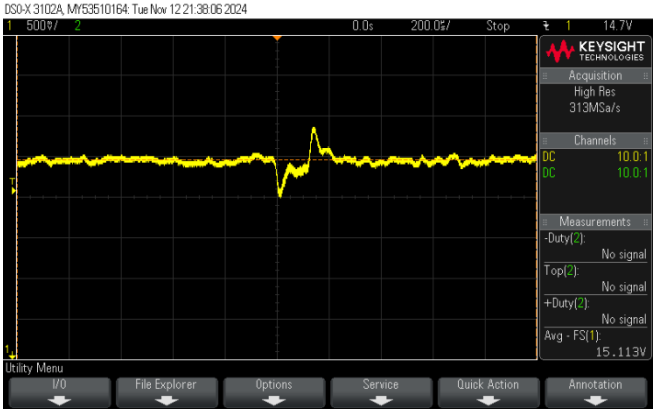

Figure 3 :Transient Response (VIN=28V, IOUT= 5-10A, 0.1A/us, No external COUT)

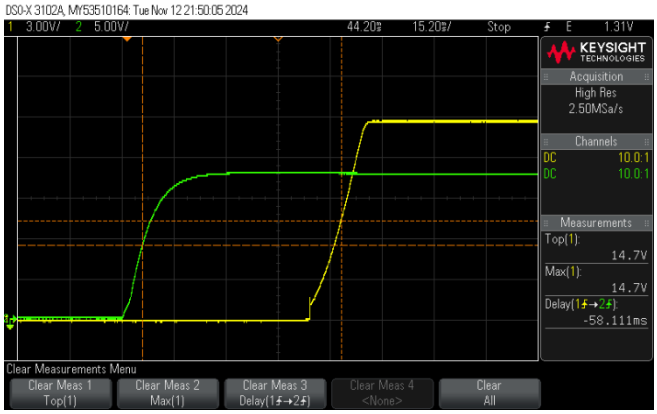

Figure 4 :Start up, VIN=18V, IOUT=10A, No external COUT

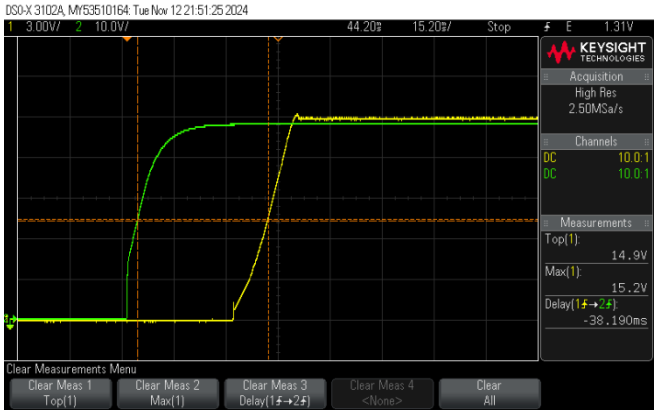

Figure 5 ::Start up, VIN=50V, IOUT=10A, No external COUT

Figure 6 :Output ripple (VIN=28V, IOUT=10A, CR, No external COUT

Functional Descriptions

Input Power Pins
Enable Pin
TRIM pin
TM
SGND
Output Power Pins

Package Outline and

Recommended Land Pattern

Contacts