SIL25C SERIES

Single negative output

Trim range (–4.5 Vdc to –5.5 Vdc)

High power density design means reduced board space requirement

Remote sense

Power good output signal (open collector)

Operating ambient temperature to 80 °C with suitable derating and forced air cooling
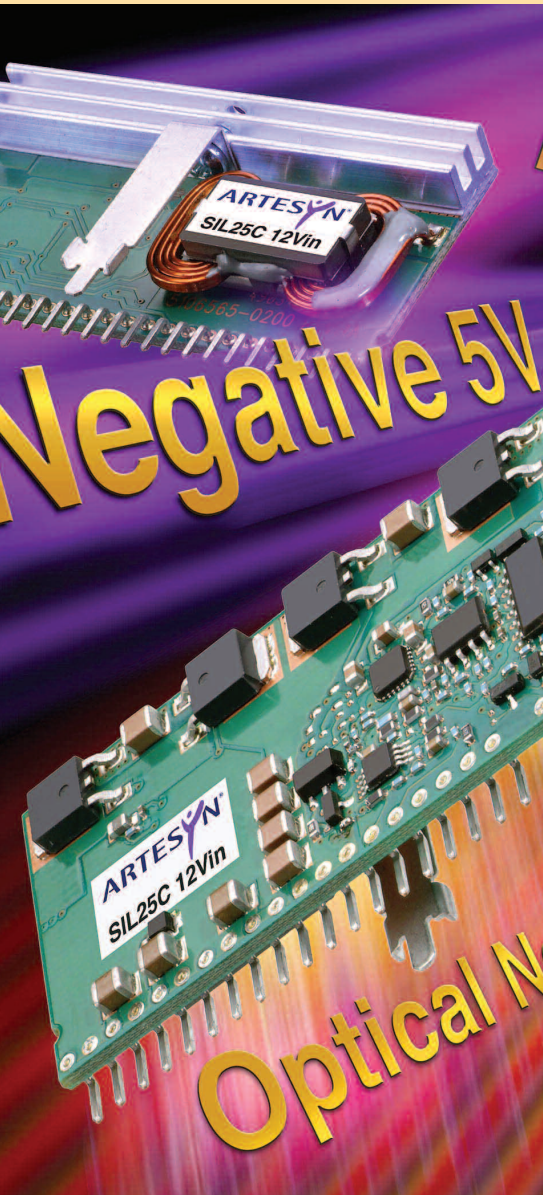
Remote ON/OFF (active high)

Overtemperature protection

0 A minimum load

Input undervoltage lockout

Overcurrent and short–circuit protection

Available RoHS compliant

The SIL25C is a new high density non-isolated dc-dc converter. The converter has a wide input range (10.2 Vdc to 13.8 Vdc) and offers a -4.5 Vdc to -5.5 Vdc output voltage range with a 25 A load. The series offers remote ON/OFF, over-temperature protection and over-current protection as standard.

The remote sense feature enables the SIL25C compensate for voltage drops between the converters output and the load. With full international safety approvals including EN60950 and UL/cUL60950 the SIL25C reduces compliance costs and time to market.

[2 YEAR WARRANTY]

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Absolute Maximum Ratings

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - continuous	$V_{in\,(cont)}$	-0.3		13.8	V DC	$V_{in(+)}$ - $V_{in(-)}$
Operating temperature	T_{op}	-40		80	°C	Measured at thermal reference points, see Note 1. Higher ambient operation possible with forced air cooling. See de-rating curves
Power Good pull-up voltage				15	V	
Storage temperature	$T_{storage}$	-40		125	°C	
Output current	Iout	0		25	A	

All specifications are typical at nominal input Vin = 12V, full load under any resistive load combination at 25°C unless otherwise stated.

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - operating	$V_{in\,(oper)}$	10.2	12.0	13.8	V DC	
Input current - no load	I_{in}		280	400	mADC	$V_{in\,(min)}$ - $V_{in\,(max)}$, enabled
Input current - Quiescent	$I_{in\,(off)}$		30	40	mADC	Converter disabled
Input voltage variation	dv/dt		1.0		V/ms	

Turn On/Off

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - turn on	$V_{in\,(on)}$	8.5	10.0	10.2	V DC	
Input voltage - turn off	$V_{in\,(off)}$	8.5	9.5	10.0	V DC	
Turn on delay - enabled, then power applied	$T_{delay\,(power)}$			30	msec	With the Remote ON/OFF signal asserted, this is the time from when the input voltage reaches the minimum specified operating voltage until the POWER GOOD is asserted high
Turn on delay - power applied, then Remote ON/OFF asserted	$T_{delay\,(Remote\,ON/OFF)}$			20	msec	V_{in} = $V_{in\,(nom)}$, then Remote ON/OFF asserted. This is the time taken until the POWER GOOD is asserted high
Output to Power Good delay	T_{delay}			20	msec	Output voltage in full regulation to POWER GOOD asserted high
Rise time	T_{rise}		8		msec	From 10% to 90%; full resistive load, 2 x 680µF external capacitance

Signal Electrical Interface

Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
At remote/control ON/OFF pin Open collector or equivalent compatible						**See Notes 2 and 3** See Application Note 148 for Remote ON/OFF details
Control pin open circuit voltage	V_{ih}		2.6	4	V	$I_{ih} = 0$ µA; open circuit voltage
High level input current	I_{ih}			1	µA	Current flowing into control pin when pin is pulled high (max. at $V_{ih} = 13.8V$)
High level input voltage	V_{ih}	2.50			Vin	Converter guaranteed on when control pin is greater than V_{ih} (max)
Low level input voltage	V_{il}			1.20	V	Converter guaranteed off when control pin is less than V_{il} (max)
Low level input current	I_{il} (max)			1.3	mA	$V_{il} = 0.0$ V;

Reliability and Service Life

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Mean time between failure	MTBF	282,000			Hours	MIL-HDBK-217F, $V_{in} = V_{in (nom)}$; $I_{out} = I_{out (max)}$; ambient 25ºC; ground benign environment
Mean time between failure	MTBF	3,000,000			Hours	Telcordia SR-332 Issue 3, ground benign, temp. = 40ºC, $V_{in} = V_{in (nom)}$, $I_{out} = I_{out (max)}$

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Other Specifications

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Switching frequency	F_{SW}		250		kHz	Per phase, (2 phase)
Weight			28.3		g	

Safety Agency Approvals

Characteristic	
UL/cUL 60950 File No.	TBD
TÜV Product Service IEC 60950	Certificate No. TBD

Material Ratings

Characteristic - Signal Name	Notes and Conditions
Flammability rating	UL94V-0
Material type	FR4 PCB

Model Numbers

Model Number	Input Voltage	Output Voltage	Output Current (Max.)	Typical Efficiency	Max. Load Regulation
SIL25C-12SNEG-VJ	12VDC	-4.5V to -5.5V	25A	90%	±1.0%

RoHS Compliance Ordering Information

RoHS
2002/95/EC

The 'J' at the end of the part number indicates that the part is Pb-free (RoHS 6/6 compliant). TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.

SIL25C-12SNEG-VJ

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		11.6		A DC	$V_{in} = V_{in (nom)}$; $I_{out} = I_{out (max.)}$
Reflected ripple current	$I_{in (ripple)}$		60 300		mA RMS mA pk-pk	$I_{out} = I_{out (max.)}$, measured with external filter. See Application Note 148 for details
Input capacitance - internal filter	C_{input}		18.8		µF	
Input capacitance - external input	C_{bypass}		800		µF	Recommended customer added capacitance

SIL25C-12SNEG-VJ

Electrical Characteristics – O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom)	-4.85	-5.05	-5.25	V DC	$V_{in} = V_{in (nom)}$; $I_{out} = I_{out (NL)}$ Worst case condition over line, load, temperature and life
Line regulation				±1.0	%	$I_{out} = V_{in (min)}$ to $V_{in (max)}$
Load regulation				±1.0	%	$V_{in} = V_{in (nom)}$; $I_{out (min)}$ to $I_{out (max)}$
Output current continuous	Iout	0		25	A DC	
Output current - short circuit	I_{sc}			23.9	A rms	Continuous, unit auto recovers from short
Output voltage - noise	V_{p-p} V_{rms}			100 50	mV pk-pk mV rms	Measurement bandwidth 20 MHz See Application Note 148 for measurement set-up details

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SIL25C–12SNEG–VJ

Electrical Characteristics – O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Load transient response - peak deviation	$V_{dynamic}$		75		mV	Peak deviation for 50% to 75% step load, di/dt = 1A/µs
Load transient response - recovery	$T_{recovery}$		150		µsec	Settling time to within 1% of output set point voltage for 50% to 75% step load
External load capacitance	C_{ext}		1360		µF	Maximum capacitor value may vary with load conditions

SIL25C–12SNEG–VJ

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overcurrent limit inception	I_{oc}		35		A DC	V_O = 90% of V_O (nom)
Open sense voltage			-5.05		V DC	Sense pins not connected

SIL25C–12SNEG–VJ

Efficiency

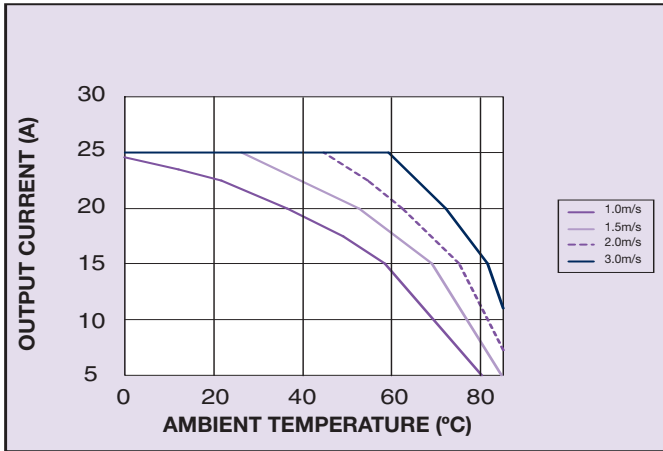| Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η	89.0	90.4		%	I_{out} = 100% $I_{out (max)}$, V_{in} = $V_{in (nom)}$
Efficiency	η	90.7	92.7		%	I_{out} = 50% $I_{out (max)}$, V_{in} = $V_{in (nom)}$

SIL25C–12SNEG–VJ

**Figure 1: Thermal De-rating Curve
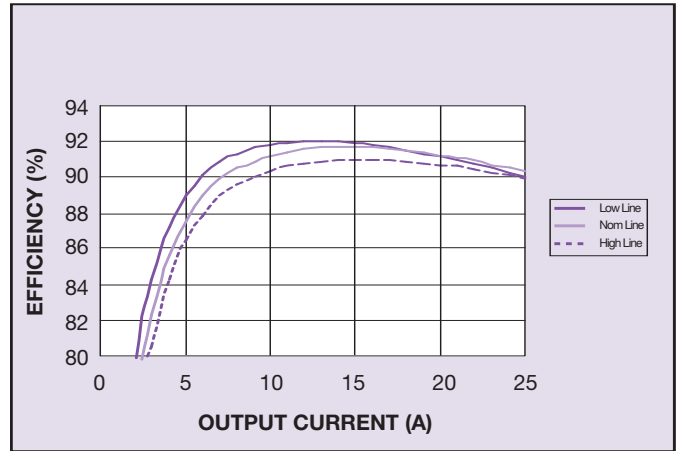Airflow Direction from Pin 24 to Pin 1**

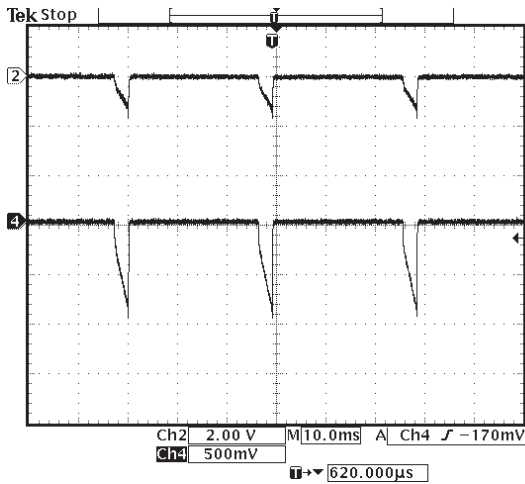
Figure 2: Efficiency vs Load and Line

**Figure 3: Short Circuit Characteristic
(Channel 4: Output Current at 10A/div,
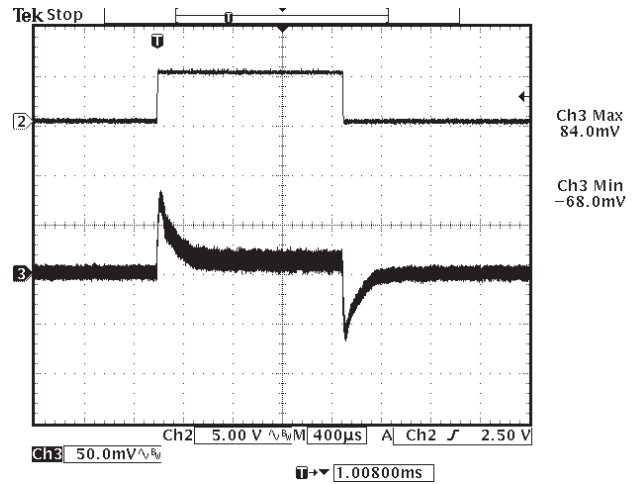Channel 2: Output Voltage)**

**Figure 4: Transient Response 50-75% - 50%, 1A/μS
(Channel 2: Current load step at 5A/div,
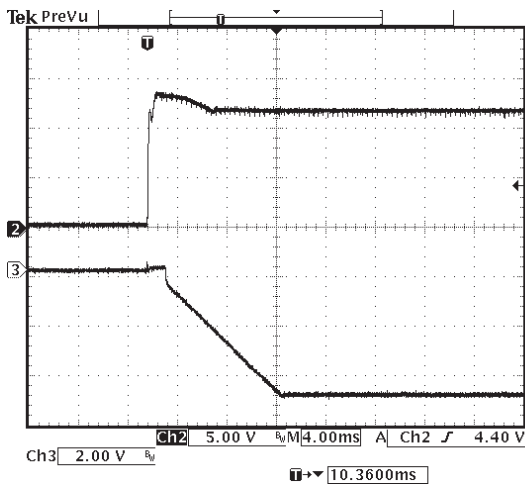Channel 3: Output Voltage deviation)**

**Figure 6: Typical Power Up
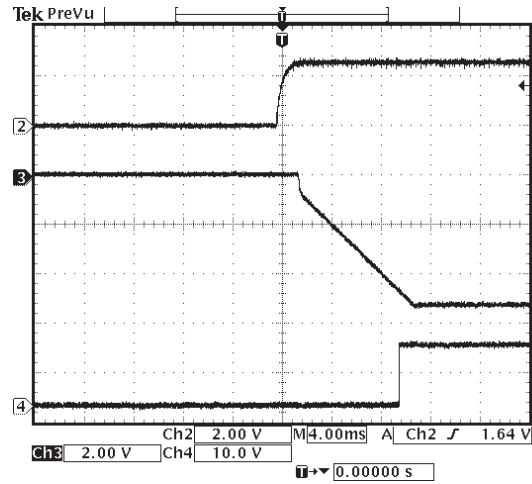(Channel 2: DC Input, Channel 3: Output Voltage)**

**Figure 7: Control On/Off
(Channel 2: Remote ON/OFF, Channel 3: Output Voltage
Channel 4: Power Good)**

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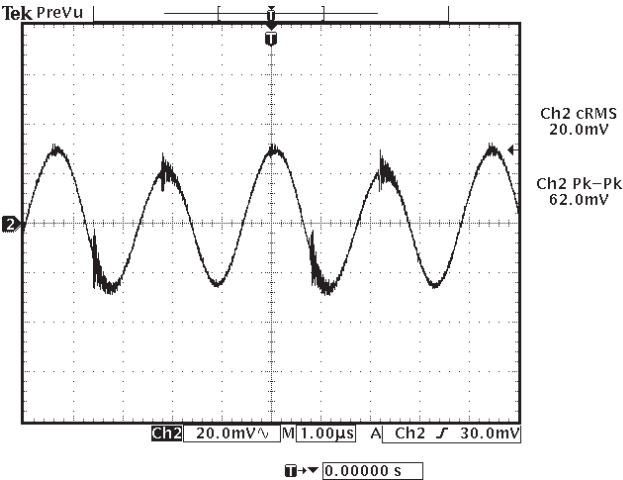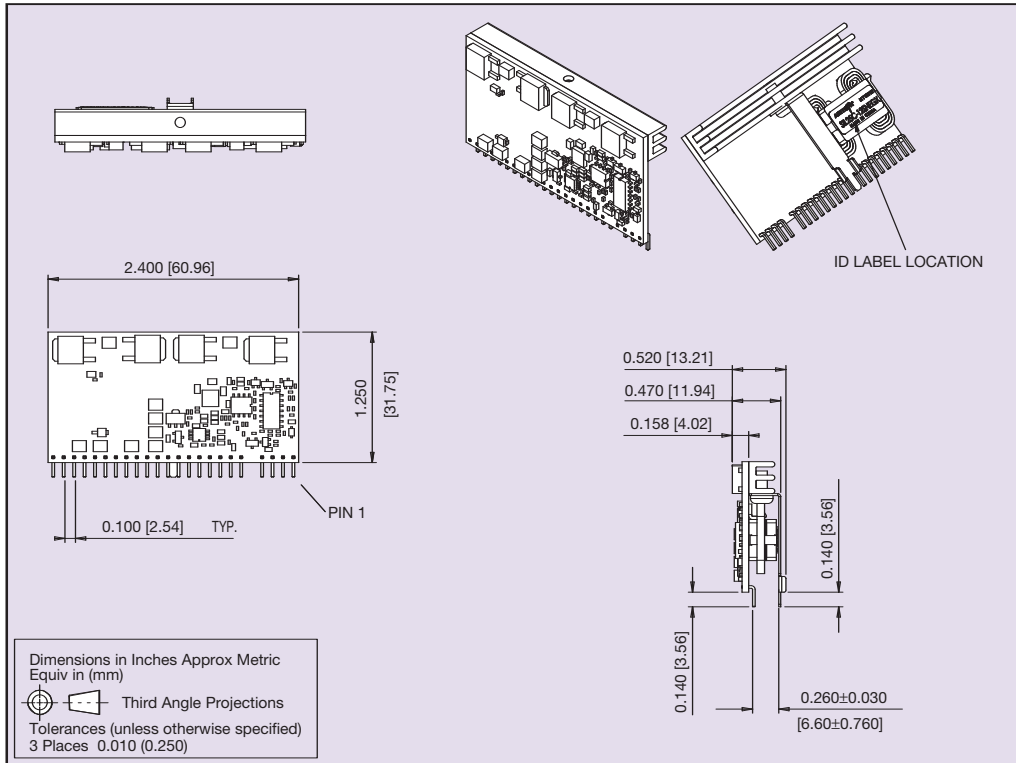**T E C H N O L O G I E S**

SIL25C-12SNEG-VJ

Figure 8: Typical Ripple and Noise

2.400 [60.96]

1.250 [31.75]

0.100 [2.54]   TYP.

PIN 1

ID LABEL LOCATION

0.520 [13.21]

0.470 [11.94]

0.158 [4.02]

0.140 [3.56]

0.140 [3.56]

0.260±0.030
[6.60±0.760]

Dimensions in Inches Approx Metric
Equiv in (mm)

Third Angle Projections

Tolerances (unless otherwise specified)
3 Places 0.010 (0.250)

Pin Connections

Pin No.	Function
1	TRIM
2	Not Connected
3	Ground
4	POWER GOOD
5	No Pin
6	Not Connected
7	Ground
8	Ground
9	Remote ON/OFF
10	Remote Sense (GND)
11	Remote Sense (O/P)
12	Vin
13	Vin
14	Vin
15	Vout
16	Vout
17	Ground
18	Vout
19	Ground
20	Vout
21	Ground
22	Vout
23	Ground
24	Vout

Figure 9: Mechanical Drawing and Pinout Table

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Note 1

Thermal reference point is defined as the highest temperature measured at any one of the specified thermal reference points.

Note 2

The control pin is referenced to Vin-

Note 3

The SIL25C is supplied as standard with active High logic.
Control input pulled low: Unit Disabled
Control input left open: Unit Enabled

Note 4

Thermal reference set up: Unit mounted on an edge card test board 215mm x 115mm. Test board mounted vertically. For test details and recommended set-up see Application Note 148.

Note 5

3-200Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points.

CAUTION: Hazardous internal voltages and high temperatures. Ensure that unit is accessible only to trained personnel. The user must provide the recommended fusing in order to comply with safety approvals.

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