5V 3.5A Low Loss Power Distribution Switch with Programmable Current limit

General Description

The CS5711R is an ultra-low RDS(ON) Power Distribution switch with current limit to protect the power source from over current and short circuit conditions. It incorporates over temperature protection and reverse blocking function.

Features

- Input Voltage: 2.4V to 5.5V
- Extremely Low Power Path Resistance: 65mΩ (typ)
- Adjustable Current Limit from 100mA to 3.5A
- Over Temperature Shutdown and Automatic Retry
- Reverse Blocking (No Body Diode)
- Output Capacitor Auto-discharge
- Built-in Soft-start
- RoHS Compliant and Halogen Free

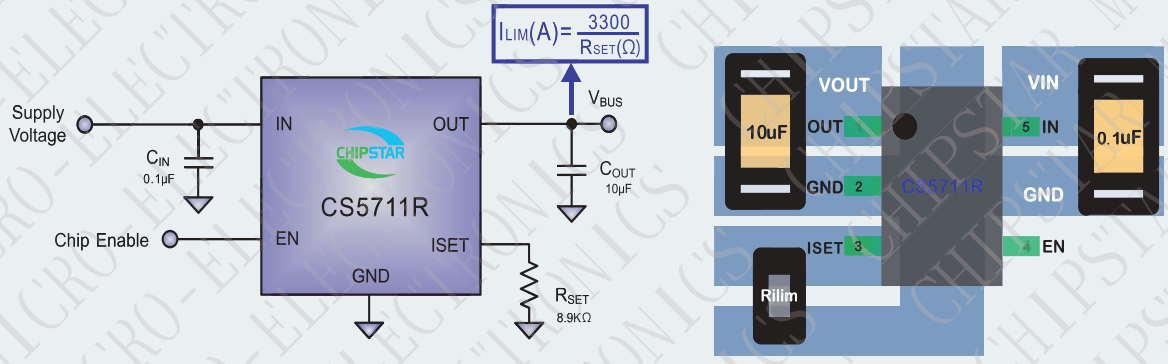
Applications

- USB 3.1 Applications
- USB ports and hubs
- TV board
- USB Charger
- VOIP phone
- Set-top box

Package

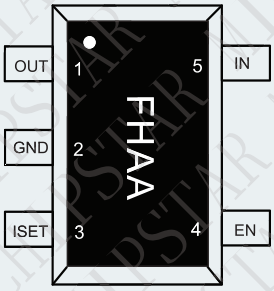
- SOT23-5

Typical Application Circuit and PCB example



Note: If 0.1μF input capacitor will lead to large VIN voltage spike, it is strongly recommended to add additional 10μF ceramic capacitor.

Pinout (Top view)



SOT23-5

Name	NO	Pin Description
OUT	1	Output pin, decoupled with a 10μF capacitor to GND.
GND	2	Ground pin
ISET	3	Current limit programming pin. Connect a resistor R_{SET} from this pin to ground to program current limit:$I_{LIM}(A)=3300/R_{SET}(\Omega)$
EN	4	ON/OFF control. Pull high to enable. Do not leave it floating.
IN	5	Input pin, decoupled with a 0.1μF capacitor to GND.

Absolute Maximum Ratings

IN, OUT, ISET, EN	-0.3V to 6.5V
Power Dissipation, PD @ TA = 25°C, SOT23-5	0.94W
Package Thermal Resistance (Note 2)	
θ_{JA}	180°C/W
θ_{JC}	90°C/W
Junction Temperature	150°C
Lead Temperature (Soldering, 10 sec.)	260°C
Storage Temperature Range	-55°C to 150°C
Junction Temperature Range	-40°C to 125°C
Ambient Temperature Range	-40°C to 85°C
ESD HBM(Human Body Mode)	2KV
ESD MM(Machine Mode)	200V

Recommended Operating Conditions(Note 3)

IN, OUT	2.4V to 5.5V
All Other Pins	0V to 5.5V
Junction Temperature Range	-40°C to 125°C
Ambient Temperature Range	-40°C to 85°C

Order Information

Device	Package	Making	Reel Size	Tape Width	Quantity
CS5711R	SOT23-5L	FHAA x x	7"	8mm	3000

Electrical Characteristics (VIN = 5V, COUT=10μF, TA = 25°C, BOLD values indicate -40°C to 85°C, unless otherwise specified)

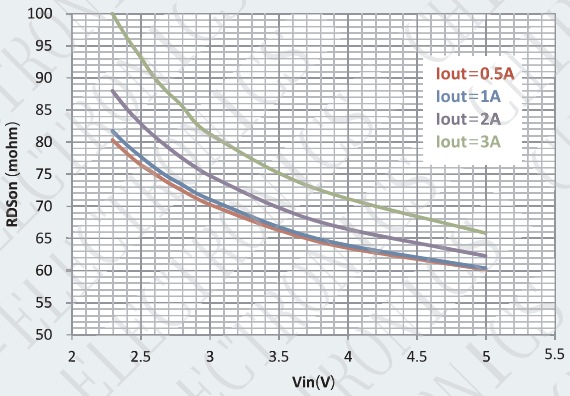
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		V_{IN}		2.4		5.5	V
IN UVLO Threshold		$V_{IN,UVLO}$				2.30	V
IN UVLO Hysteresis		$V_{IN,HYS}$			0.1		V
Shutdown Input Current		I_{SHDN}	Open load, switch off		0.1	2	μA
			Output grounded, switch off		0.1	2	μA
Reverse Leakage Current		$I_{RVS, LKG}$	IN ties to GND, V_{OUT}=5V		0.1	2	μA
Reverse Blocking Threshold		V_{RBT}	V_{OUT} - V_{IN}		100		mV
Reverse Blocking Recovery Threshold		$V_{RBT,REC}$	V_{OUT} - V_{IN}		-30		mV
Quiescent Supply Current		I_Q	Open load , switch on		25	50	μA
FET R DS(ON)		$R_{DS(ON)}$	V_{IN}=5V I_{OUT}=0.5A		65	85	mΩ
Current Limit		I_{LIM}	V_{OUT}=4V, R_{SET}=3.3K (Note 5)	0.90	1.0	1.10	A
			V_{OUT}=4V, R_{SET}=1.60K(Note 5)	1.80	2.0	2.20	A
EN Threshold	Logic -Low Voltage	V_{IL}				0.4	V
	Logic -High Voltage	V_{IH}		1.0			V
EN Input Capacitor		C_{EN}	(Note4)		1		pF
Output Turn-on Time		t_{ON}	R_L=10Ω, C_L=1μF. Measure from EN ON to V_{OUT} reaches V_{IN} x 90%	1	2	5	ms
Output Turn - on Rise Time		t_R	R_L=10Ω, C_L=1μF. Measure from EN ON to V_{OUT} =10% of V_{IN} to 90% of V_{IN}	1	2	5	ms

Output Turn - off Time	t_{OFF}	R_L=10Ω, C_L=1μF.Measure from EN OFF to V_{OUT} reaches V_{IN} x10%		22		μs
Output Turn - off Fall Time	t_F	R_L=10Ω, C_L=1 μF. Measure from V_{OUT}=90% of V_{IN} to 10% of V_{IN}		21		μs
Thermal Shutdown Temperature	T_{SD}			150		°C
Thermal Shutdown Hysteresis	T_{HYS}			20		°C
Current - limit Response Time	$t_{OC,RES}$	I_{LOAD} =1.2 x I_{LIMIT}		25		μs
Short Circuit Response Time	t_{OC}	I_{LOAD} =1.5 x I_{LIMIT}		2		μs
Reverse Blocking Response Time	t_{RBT}	(Note 4)		800		ns

Note 1: Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
Note 2: θ_{JA} is measured in the natural convection at TA = 25°C on a Silergy's test board. The pin 2 of SOT23-5 package is the case position for θ_{JC} measurement.
Note 3: The device is not guaranteed to function outside its operating conditions.
Note 4: Guaranteed by design but not production tested.
Note 5: Current limit threshold is determined by I_{LIMIT}=3300/R_{SET}, where R_{SET} is in Ω.

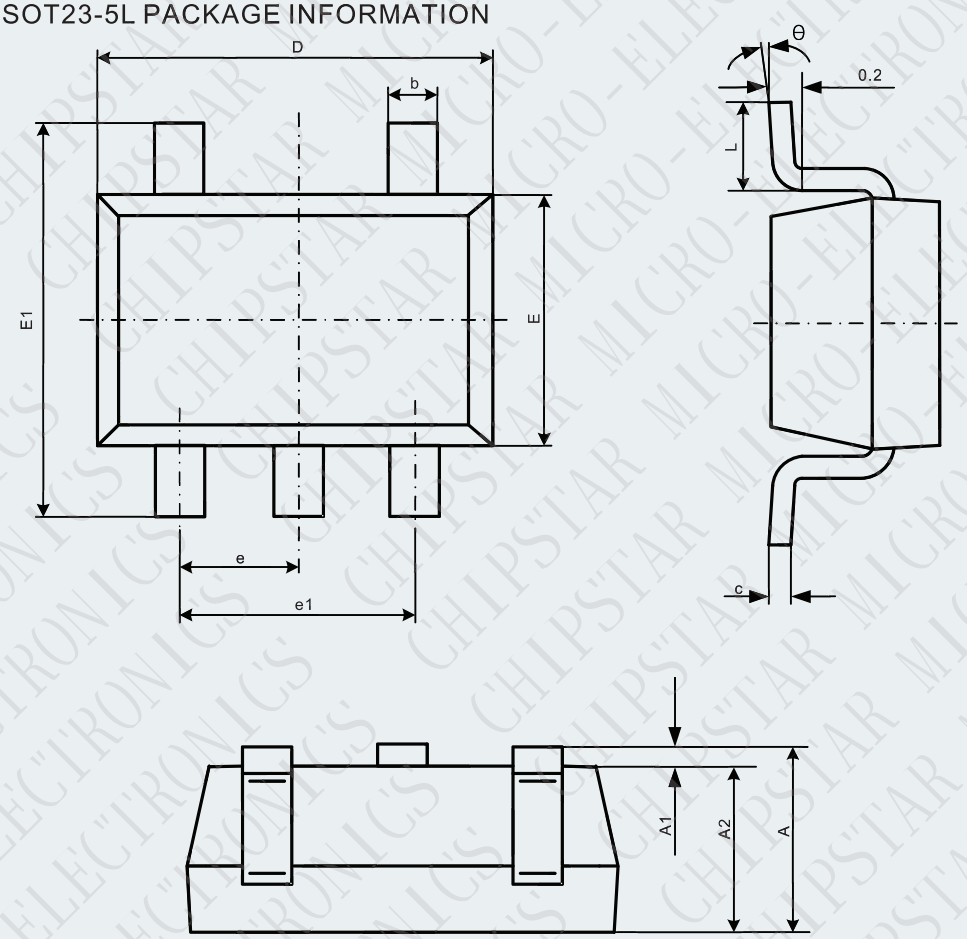
TYPICAL CHARACTERISTICS (Typical values are at TA =25°C unless otherwise specified.)

Power Switch Rdson Vs. Vin



Package Information

CS5711R SOT23-5L PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°