

70mΩ, 3A Smart Universal Power Switch with Flag

General Description

The LN9703 is a low voltage, high performance single N-MOSFET power switch, designed for power rail on/off control with low $R_{DS(ON)} \approx 70m\Omega$ and full protection functions. The LN9703 equipped with a charge pump circuitry to drive the internal MOSFET switch and a flag output is available to indicate fault conditions against large di/dt which may cause the supply to fall out of regulation. In order to fit different application, an ISET pin is offered for current limit point setting, a resistor from ISET to ground sets the current limit for the switch.

Additional features include soft-start to limit inrush current during plug-in, thermal shutdown to prevent catastrophic switch failure from high-current loads, Output anti back irrigation Protection whether EN pin is connected GND or VIN, under-voltage lockout (UVLO) to ensure that the device remains off unless there is a valid input voltage present, a precision resistor-programmable output current limit up to 3.5A. Besides, the lower quiescent current as 40μA making this device ideal for portable battery-operated equipment.

The LN9703 is available in SOT23-5 or SOP-8 package requiring minimum board space and smallest components.

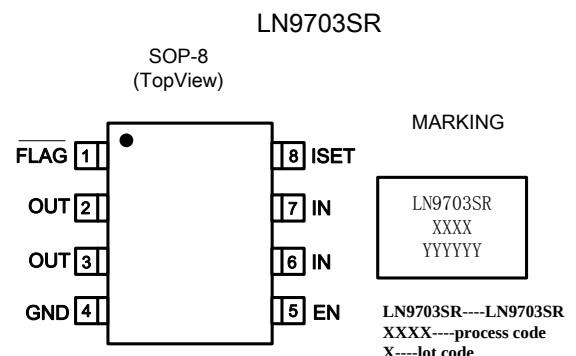
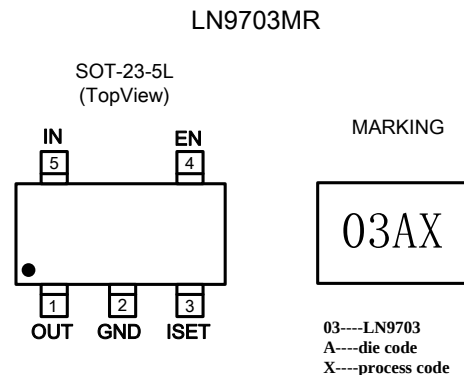
Applications

- USB 3G Datacard
- USB Dongle
- MiniPCI Accessories
- LCD Monitor, LCD-TV
- USB Power Module for ADSL
- Information Appliance and Set-Top Box
- Battery-Powered Equipment
- Hot-Plug Power Supplies
- ACPI Power Distribution
- PCI Bus Power Switching
- Motherboard & Notebook PCs
- PC Card Hot Swap Application

Features

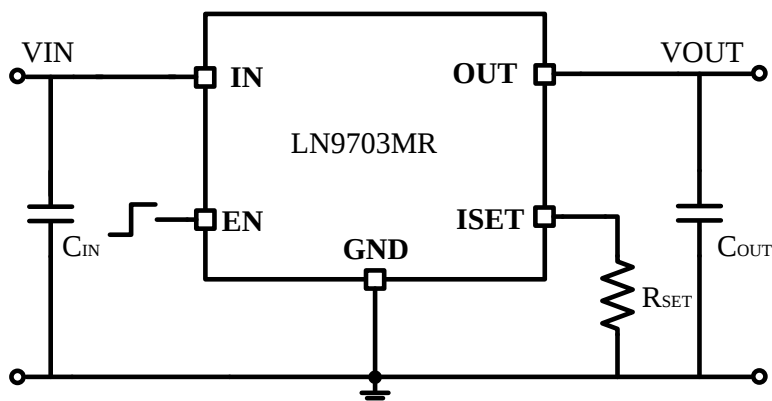
- Adjustable Current Limiting up to 3.5A
- Built-In (Typically 70mΩ) N-MOSFET
- Reverse Current Flow Blocking (no body diode)
- Output Can Be Forced Higher than Input (Off or On State)
- Low Supply Current :
-----40μA Typical at Switch on State
-----Less than 1μA Typical at Switch Off State
- Guaranteed Continuous Load Current
-----LN9703MR (SOT23-5) : 2.1A
-----LN9703SR (SOP-8) : 3A
- Wide Input Voltage Ranges : 2V to 5.5V
- Open-Drain Fault Flag Output
- Hot Plug-In Application (Soft-Start)
- 1.7V Typical Under-Voltage Lockout (UVLO)
- Thermal Shutdown Protection
- Smallest SOT23-5 and SOP-8 Package
- RoHS Compliant and 100% Lead (Pb)-Free

Pin and Marking

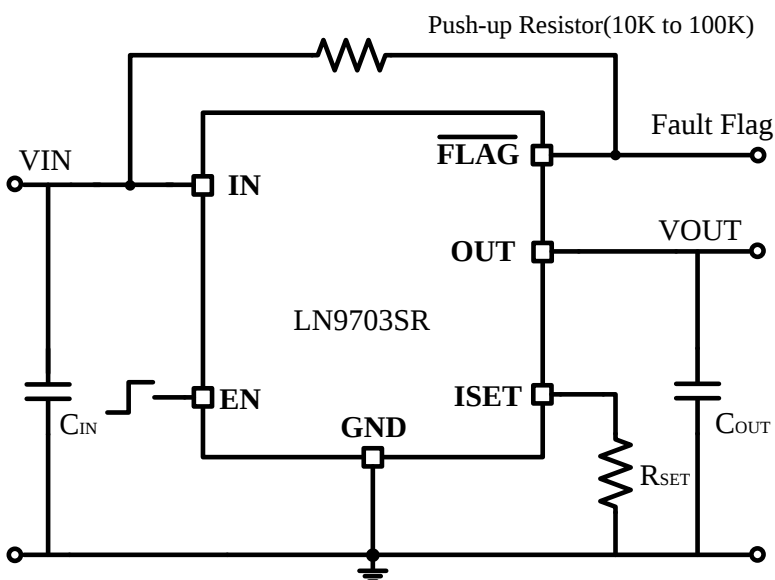


■ Typical Application Circuit

Circuit 1:



Circuit 2:



Note: Current limit: $I_{LIMIT} = 270K/R_{SET}$.

■ Functional Pin Description

Pin Name	Pin Function
IN	Power Input Voltage.
OUT	Output Voltage.
GND	Ground.
EN	Chip Enable (Active High).
ISET	Current Limit Programming Input.
$\overline{FLAG}$	Open-Drain Fault Flag Output.

■ Absolute Maximum Ratings

- Supply Voltage ----- 6.5V
- Chip Enable Input Voltage ----- -0.3V to 6.5V
- Flag Voltage----- 6.5V
- Power Dissipation, PD @ TA = 25 °C
 SOT23-5----- 0.6W
 SOP-8 ----- 0.95W
- Package Thermal Resistance
 SOT23-5-----200 °C/W
 SOP-8, θ_{JA} -----104 °C/W
- Junction Temperature -----125°C
- Lead Temperature (Soldering, 10 sec.) -----260°C
- Storage Temperature Range ----- -65°C to 150°C
- ESD Susceptibility (Note 2)
 HBM (Human Body Mode) -----8kV
 MM (Machine Mode) ----- 800V

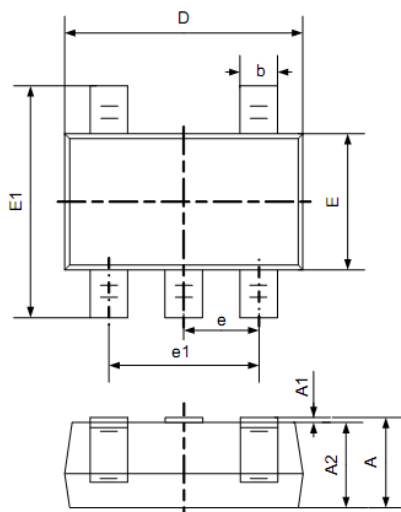
■ Electrical Characteristics

(VS = +5V, VCM = +2.5V, VO = +2.5V, TA = +25°C, unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Switch On Resistance	$I_{OUT} = 1A$		70	80	mΩ
I_{SW_ON}	Supply Current	Switch On, $V_{OUT} = \text{Open}$		40	50	μA
I_{SW_OFF}	Shutdown Current	Switch Off, $V_{OUT} = \text{Open}$		0.1	1	μA
V_{IL}	CE Threshold Logic-Low Voltage	Switch Off			0.8	V
V_{IH}	CE Threshold Logic-High Voltage	Switch On	2.0			V
I_{CE}	CE Input Current	$V_{CE} = 0V \text{ to } 5.5V$		10		pA
$I_{LEAKAGE}$	Output Leakage Current	$V_{CE} = 0V, R_{LOAD} = 0\Omega$		0.5		μA
T_{ON_RISE}	Output Turn-On Rise Time	10% to 90% of V_{OUT} rising		1.5		ms
	Current Limit Factor	$I_{LIM} \times R_{SET}$		270k		A·Ω
I_{LIMSET}	Max. Current Limit Setting	$V_{IN}=3.3V \text{ to } 5.5V, R_{SET}=75k\Omega$			3.5	A
ΔI_{LIMSET}	Current Limit Setting Accuracy	$I_{LIMSET} = 0.5A \text{ to } 3A$ ($R_{SET} = 540k\Omega \text{ to } 90k\Omega$)	-20		+20	%
R_{FLG}	FLAG Output Resistance	$I_{SINK} = 1mA$		15	400	Ω
I_{FLG_OFF}	FLAG Off Current	$V_{FLG} = 5V$		10		nA
t_D	FLAG Delay Time	Form fault condition to FLAG assertion	2	4.6	8	ms
V_{UVLO}	Under-Voltage Lockout	V_{IN} increasing	1.3	1.7		V
ΔV_{UVLO}	Under-Voltage Hysteresis	V_{IN} decreasing		0.1		V
T_{SD}	Thermal Shutdown Protection			120		°C
ΔT_{SD}	Thermal Shutdown Hysteresis			30		°C

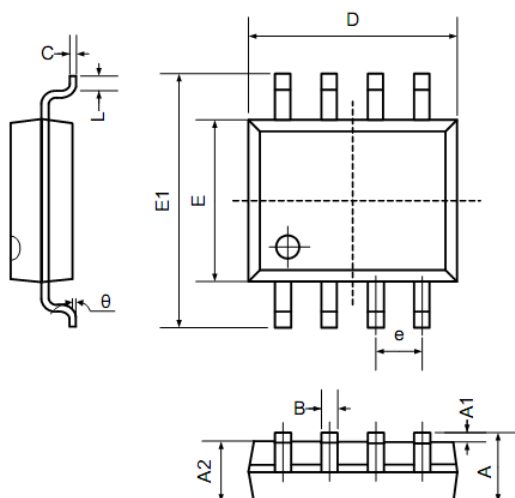
Package Information

SOT-23-5L



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	0.400	0.012	0.016
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	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°