

General Description

The MIC94062 and MIC94063 are soft start, high-side load switches housed in the SC-70-6 package. The devices contain a low on-resistance, 100m Ω (max) P-channel MOSFET that is driven by built-in level-shift and slew-rate control circuitry. The low on-resistance supports over 2A of continuous current. The MIC94063 features an active load circuit that discharges capacitive loads through a 200 Ω switch when the IC is set to the OFF state.

Pull-down circuitry keeps the MIC94062/3 in a default OFF state until the EN pin is pulled to a high level. The built-in level shift circuitry allows for a logic signal that may be different from the supply voltage to switch the high-side P-channel MOSFET on or off. Integrating the level-shift and slew-rate control circuitry saves valuable board space and reduces component placement cost compared to discrete solutions. The 500 μ s turn-on slew rate control prevents in-rush current from causing glitches on the supply rail.

Battery life is saved in portable applications with the IC's low quiescent current of 2 μ A and low shutdown current of <1 μ A. Their 1.8V to 5.5V operating voltage range makes the MIC94062/63 suitable for 1-cell Lithium ion, 2- to 3-cell NiMH/ NiCad/Alkaline, as well as other sub-5V input applications.

The MIC94062 and MIC94063 are housed in the *Teeny*TM SC-70-6 package and offered in both standard and Pb-free lead finishes.

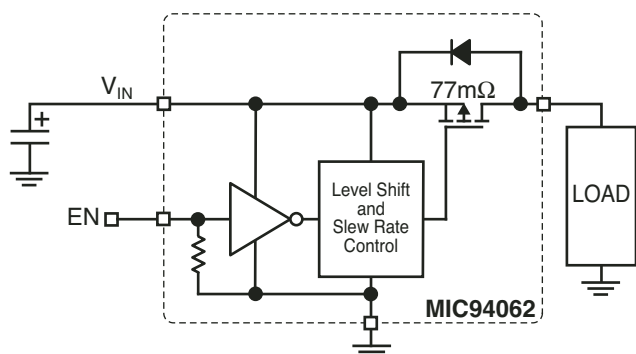
Features

- 1.8V to 5.5V input voltage range
- Built-in level shift circuitry:
Can be driven by 1.5V logic
- Low on-resistance P-channel MOSFET:
77m Ω at $V_{GS} = 4.5V$ (typ)
2A continuous current
- Built-in slew-rate control:
Controlled 500 μ s turn-on rise-time
Fast 60ns turn-off fall time
- 2kV ESD protection
- Low 2 μ A quiescent current
- <1 μ A micropower shutdown
- Built-in fast-off load discharge circuit (MIC94063)
- *Teeny*TM SC-70-6 package

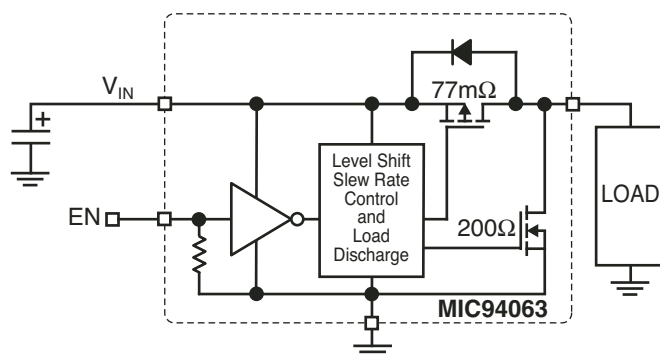
Applications

- Load switch in portable applications:
Cellular phones
PDAs
MP3 players
Digital cameras
Notebook PCs
Barcode scanners
- Battery switch-over circuits
- Level translators

Typical Application



Load Switch Application



Load Switch Application
with Capacitive Load Discharge

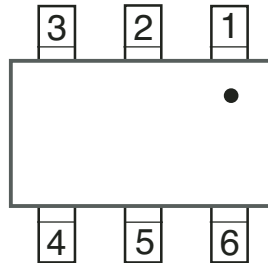
Ordering Information

Part Number	Load Discharge Circuitry	Marking Code	Junction Temp. Range	Package	Pb-Free
MIC94062BC6	No	P56	−40°C to 125°C	SC-70-6	No
MIC94063BC6	Yes	P57	−40°C to 125°C	SC-70-6	No
MIC94062YC6	No	P56 ⁽¹⁾	−40°C to 125°C	SC-70-6	Yes
MIC94063YC6	Yes	P57 ⁽¹⁾	−40°C to 125°C	SC-70-6	Yes

Notes

- Underscored first charcter denotes Pb-free ("P").

Pin Configuration



SC-70-6 (C6)

Pin Description

Pin Number	Pin Name	Pin Function
1	VOUT	Drain of P-channel MOSFET; no bypass capacitor required.
2, 5	GND	Ground connections.
3	EN	Enable input.
4	VIN	Source of P-channel MOSFET; no bypass capacitor required.
6	NC	No connect.

Absolute Maximum Ratings (1)

Input Voltage (V_{IN})	+6V
Enable Voltage (V_{EN})	+6V
Continuous Drain Current (I_D) (3)	
$T_A = 25^\circ\text{C}$	 $\pm 2\text{A}$
$T_A = 85^\circ\text{C}$	 $\pm 1.4\text{A}$
Pulsed Drain Current (I_{DP}) (4)	 $\pm 6\text{A}$
Continuous Diode Current (I_S) (5)	 -50mA
Power Dissipation (3)	
SC-70-6 lead ($T_A = 85^\circ\text{C}$)	270 mW
Ambient Storage Temperature (T_S)	 -55°C to $+150^\circ\text{C}$
ESD Rating (6)	2kV

Operating Ratings(2)

Input Voltage Range (V_{IN})	1.8V to 5.5V
Junction Temperature Range (T_J)	 -40°C to $+150^\circ\text{C}$
Package Thermal Impedance (3)	
θ_{JA} SC-70-6 lead	 240°C/W

Electrical Characteristics

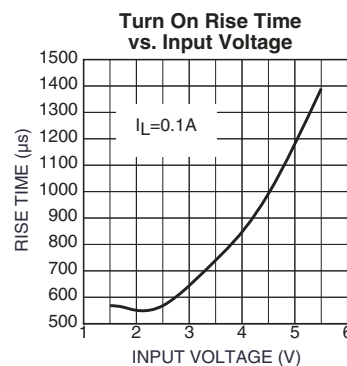
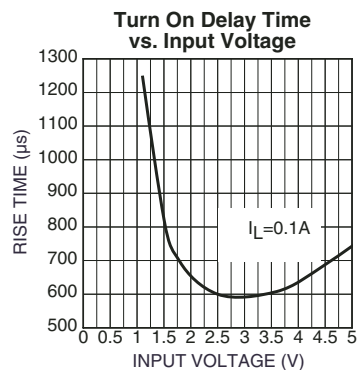
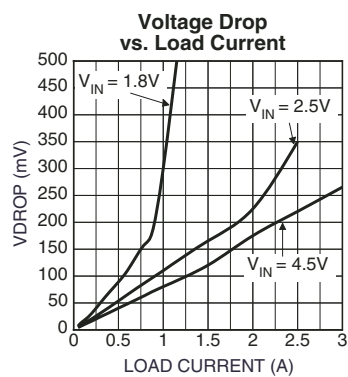
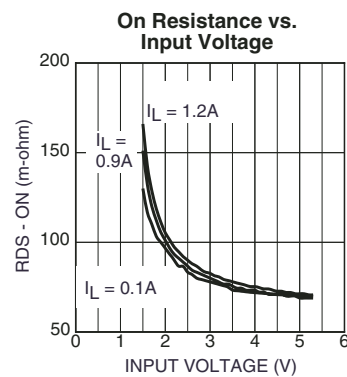
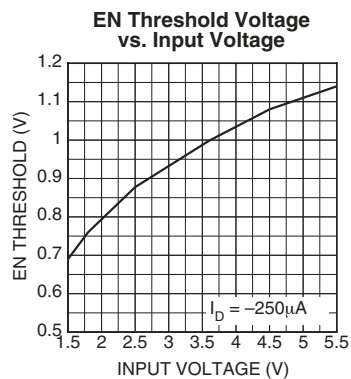
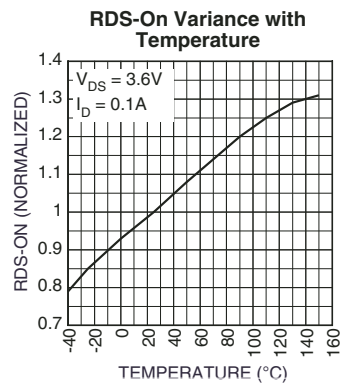
$T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Condition	Min	Typ	Max	Units
Static						
$V_{EN(th)}$	EN Threshold Voltage	$V_{IN} = 1.8\text{V}$ to 4.5V , $I_D = -250\mu\text{A}$	0.5		1.2	V
I_{EN}	EN Input Current (Quiescent Current)	$V_{IN} = V_{EN} = 5.5\text{V}$		2	4	μA
I_{VIN}	OFF State Leakage Current	$V_{EN} = \text{OPEN}$ or 0V , $V_{IN} = +5.5\text{V}$			1	μA
$R_{DS(ON)}$	P-Channel Drain-Source On-Resistance	$V_{IN} = 4.5\text{V}$, $I_D = -100\text{mA}$; $V_{EN} = 1.5\text{V}$		77	100	$\text{m}\Omega$
		$V_{IN} = 3.6\text{V}$, $I_D = -100\text{mA}$; $V_{EN} = 1.5\text{V}$		85	115	$\text{m}\Omega$
		$V_{IN} = 2.5\text{V}$, $I_D = -100\text{mA}$; $V_{EN} = 1.5\text{V}$		100	140	$\text{m}\Omega$
		$V_{IN} = 1.8\text{V}$, $I_D = -100\text{mA}$; $V_{EN} = 1.5\text{V}$		145	200	$\text{m}\Omega$
$R_{SHUTDOWN}$	Turn-off Impedance (94061)	$V_{IN} = 3.6\text{V}$, $V_{EN} = 0\text{V}$ or OPEN		200	300	Ω
Dynamic (7)						
$t_{d(on)}$	Turn-On Delay Time	$V_{IN} = 3.6\text{V}$, $I_D = -100\text{mA}$, $V_{EN} = 1.5\text{V}$		600	900	μs
t_r	Turn-On Rise Time	$V_{IN} = 3.6\text{V}$, $I_D = -100\text{mA}$, $V_{EN} = 1.5\text{V}$	500	800	1500	μs
$t_{d(off)}$	Turn-Off Delay Time	$V_{IN} = 3.6\text{V}$, $I_D = -100\text{mA}$, $V_{EN} = 1.5\text{V}$		70	150	ns
t_f	Turn-Off Fall Time	$V_{IN} = 3.6\text{V}$, $I_D = -100\text{mA}$, $V_{EN} = 1.5\text{V}$		60	100	ns

Notes

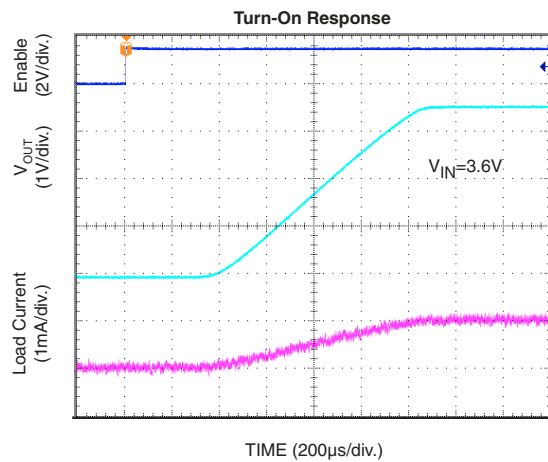
- $T_A = 25^\circ\text{C}$ unless otherwise noted. Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(Max)}$, the junction-to-ambient thermal resistance, θ_{JA} , and the ambient temperature, T_A .
- This device is not guaranteed to operate beyond its specified operating rating.
- Mounted on 1 square-inch pad of 2 oz. copper.
- Pulse width $< 300\mu\text{s}$ with $< 2\%$ duty cycle.
- Body diode current conduction is not recommended.
- IC devices are inherently ESD sensitive.
- Handling precautions required. Human body model, $1.5\text{k}\Omega$ in series with 100pF . Dynamic specifications are guaranteed by design.

Typical Characteristics

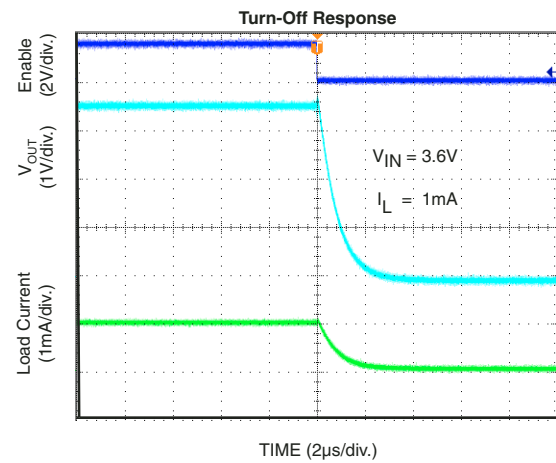


Timing Waveforms

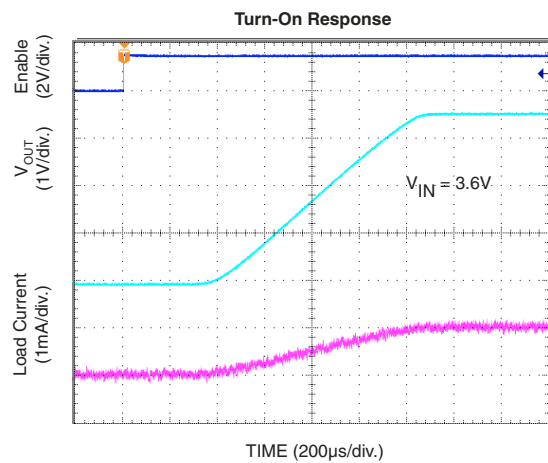
MIC94062



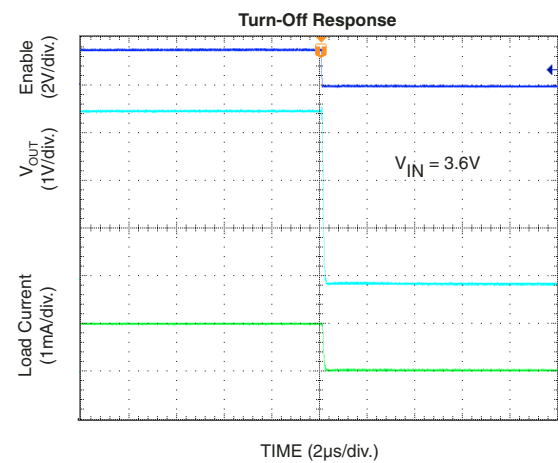
MIC94062



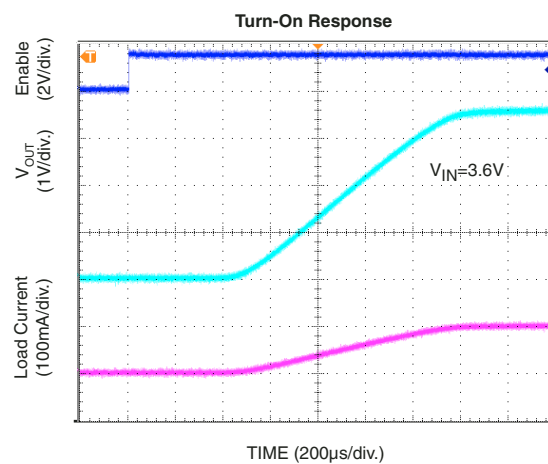
MIC94063



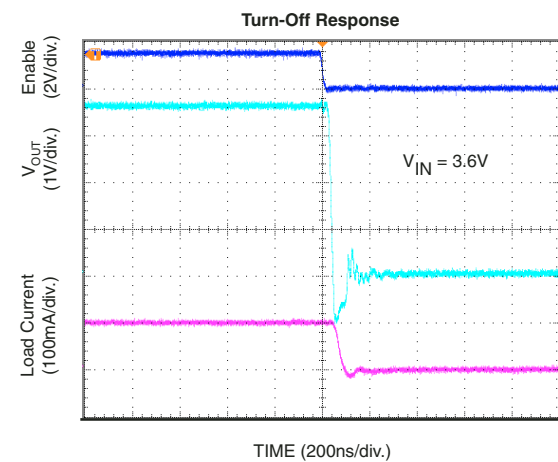
MIC94063



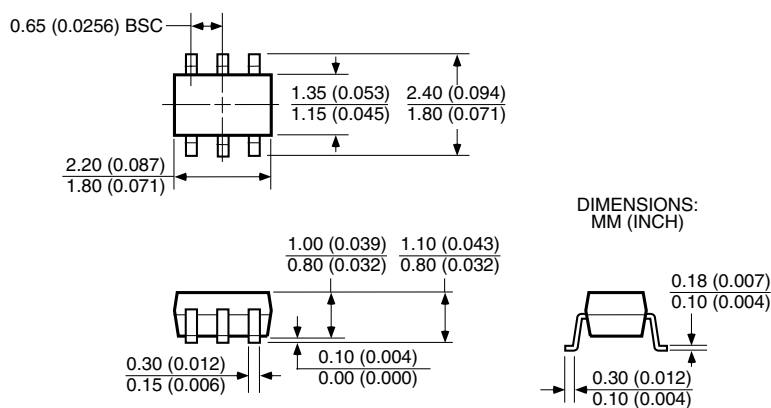
MIC94062/3



MIC94062/3



Package Information



SC-70-6 Pin (C6)

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