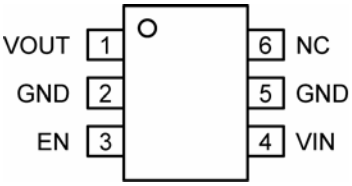
Ordering Information

Part Number		Part Marking(1)		Soft-Start	Load Discharge	Package
Standard	Pb-Free	Standard	Pb-Free			
MIC94060BC6	MIC94060YC6	P54	P54			SC-70-6
MIC94061BC6	MIC94061YC6	P55	P55		●	
MIC94062BC6	MIC94062YC6	P56	P56	●		
MIC94063BC6	MIC94063YC6	P57	P57	●	●	
—	MIC94060YMT	—	P54			1.2mm x 1.6mm Thin MLF® (2, 3)
—	MIC94061YMT	—	P55		●	
—	MIC94062YMT	—	P56	●		
—	MIC94063YMT	—	P57	●	●	

Notes

1. Underbar symbol on SC-70 Pb-free packages may not be to scale.
2. MLF® ▲ = Pin 1 identifier.
3. MLF® is a GREEN RoHS compliant package. Lead finish is NiPdAu. Mold compound is Halogen Free.

Pin Configuration



SC-70-6 (C6)

1.2x1.6 mm Thin MLF® (MT)

Pin Description

Pin Number		Pin Name	Pin Function
SC-70	MLF		
1	1	V_{OUT}	Drain of P-channel MOSFET.
2,5	2	GND	Ground and the backside pad (MLF only) should both be connected to electrical ground.
4	3	V_{IN}	Source of P-channel MOSFET.
3	4	EN	Enable (Input): Active-high CMOS compatible control input for switch A. Do not leave floating.
6	--	NIC	No Internal Connection. A signal or voltage applied to this pin will have no effect on device operation.

Absolute Maximum Ratings (1)

Input Voltage (V_{IN})	+6V
Enable Voltage (V_{EN})	+6V
Continuous Drain Current (I_D) (3)	
$T_A = 25°C$	±2A
$T_A = 85°C$	±1.4A
Pulsed Drain Current (I_{DP}) (4)	±6A
Continuous Diode Current (I_S) (4)	–50mA
Storage Temperature (T_s)	–55°C to +150°C
ESD Rating – HBM (6)	4KV

Operating Ratings (2)

Input Voltage (V_{IN})	+1.7 to +5.5V
Junction Temperature (T_A)	–40°C to +125°C
Package Thermal Resistance	
SC-70-6 (θ_{JA})	240°C/W
1.2x1.6 MLF (θ_{JA})	172°C/W
1.2x1.6 MLF (θ_{JC}) (3)	134°C/W

Electrical Characteristics

$V_{IN} = 5V$; $T_A = 25°C$, bold values indicate $–40°C \le T_A \le +85°C$, unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{EN_TH}	Enable Threshold Voltage	$V_{IN} = 1.8V$ to $4.5V$, $I_D = –250μA$	0.5		1.2	V
		$V_{IN} = 1.7V$ to $4.5V$, $I_D = –250μA$	0.4		1.2	V
I_{EN}	Enable Input Current	$V_{IN} = V_{EN} = 5.5V$		2	4	µA
I_{VIN}	OFF State Leakage Current	$V_{IN} = +5.5V$, $V_{EN} = 0V$			1	µA
$R_{DS(ON)}$	P-Channel Drain to Source ON Resistance	$V_{IN} = +4.5V$, ID = –100mA, $V_{EN} = 1.5V$		77	110	mΩ
		$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$		85	115	mΩ
	SC-70 Package	$V_{IN} = +2.5V$, ID = –100mA, $V_{EN} = 1.5V$		100	140	mΩ
		$V_{IN} = +1.8V$, ID = –100mA, $V_{EN} = 1.5V$		145	200	mΩ
		$V_{IN} = +1.7V$, ID = –100mA, $V_{EN} = 1.5V$		155	215	mΩ
$R_{DS(ON)}$	P-Channel Drain to Source ON Resistance	$V_{IN} = +4.5V$, ID = –100mA, $V_{EN} = 1.5V$		85	115	mΩ
		$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$		100	140	mΩ
	MLF Package	$V_{IN} = +2.5V$, ID = –100mA, $V_{EN} = 1.5V$		145	200	mΩ
		$V_{IN} = +1.8V$, ID = –100mA, $V_{EN} = 1.5V$		155	215	mΩ
		$V_{IN} = +1.7V$, ID = –100mA, $V_{EN} = 1.5V$		165	225	mΩ
$R_{SHUTDOWN}$	Turn-Off Resistance	$V_{IN} = +3.6V$, $I_{TEST} = 1mA$, $V_{EN} = 0V$ MIC94061, 63		200	300	Ω

Dynamic

Symbol	Parameter	Condition	Min	Typ	Max	Units
t_{ON_DLY}	Turn-On Delay Time	$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$ MIC94060, 61		0.85	1.5	µs
		$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$ MIC94062, 63		700	1200	µs
t_{ON_RISE}	Turn-On Rise Time	$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$ MIC94060, 61	0.5	1	5	µs
		$V_{IN} = +3.6V$, ID = –100mA, $V_{EN} = 1.5V$ MIC94062, 63	500	800	1500	µs

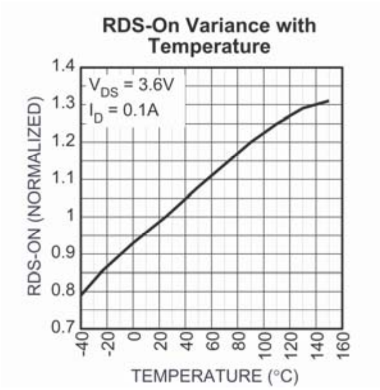
Dynamic (Continued)

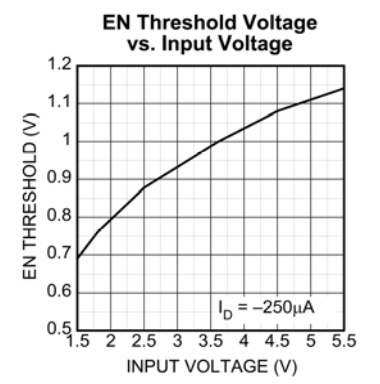
t_{OFF_DLY}	Turn-Off Delay Time	V_{IN} = +3.6V, ID = –100mA, V_{EN} = 1.5V MIC94060, 61		100	200	ns
		V_{IN} = +3.6V, ID = –100mA, V_{EN} = 1.5V MIC94062, 63		60	200	ns
t_{OFF_FALL}	Turn-Off Fall Time	V_{IN} = +3.6V, ID = –100mA, V_{EN} = 1.5V MIC94060, 61		60	100	ns
		V_{IN} = +3.6V, ID = –100mA, V_{EN} = 1.5V MIC94062, 63		60	100	ns

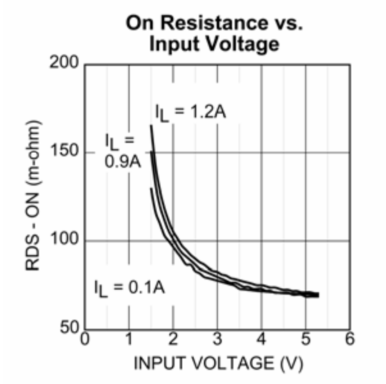
Notes:

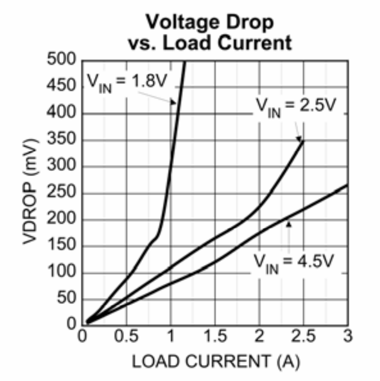
1. Exceeding the absolute maximum rating may damage the device.
2. The device is not guaranteed to function outside its operating rating.
3. With backside thermal contact to PCB.
4. Pulse width <300µs with < 2% duty cycle.
5. Continuous body diode current conduction (reverse conduction, i.e. V_{OUT} to V_{IN}) is not recommended.
6. Devices are ESD sensitive. Handling precautions recommended. HBM (Human body model), 1.5kΩ in series with 100pF.

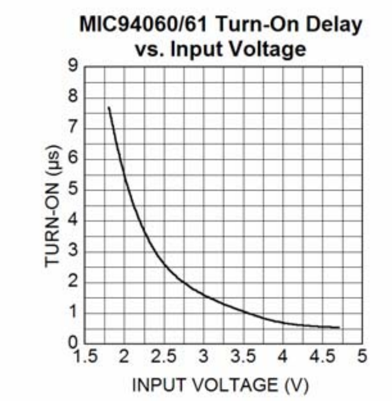
Typical Characteristics

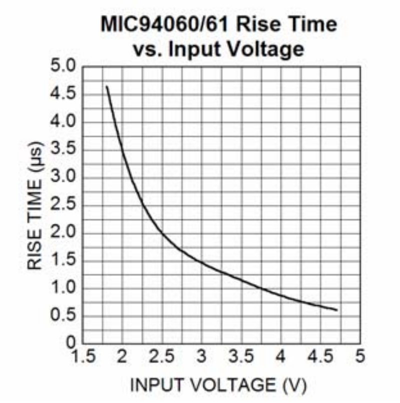

RDS-On Variance with Temperature

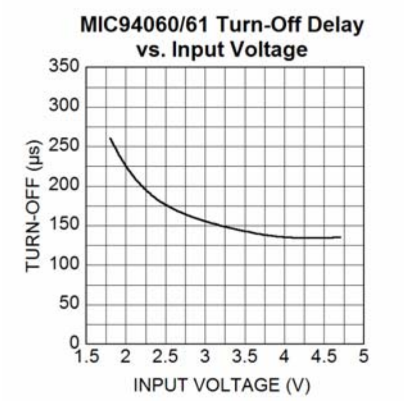

EN Threshold Voltage vs. Input Voltage

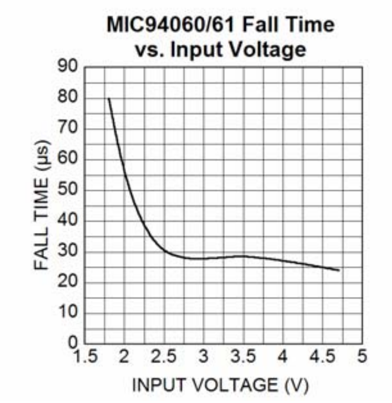

On Resistance vs. Input Voltage

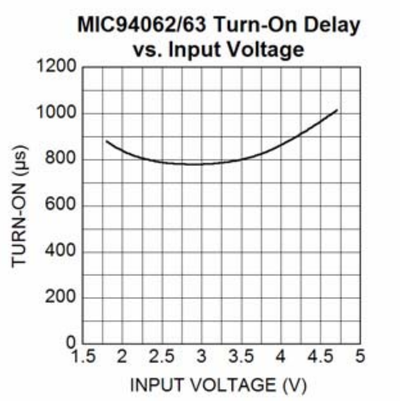

Voltage Drop vs. Load Current

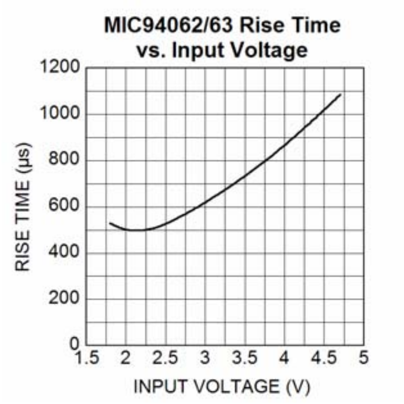

MIC94060/61 Turn-On Delay vs. Input Voltage

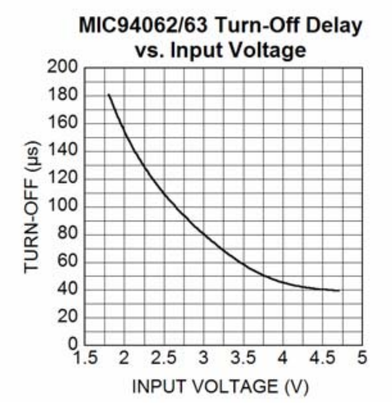

MIC94060/61 Rise Time vs. Input Voltage

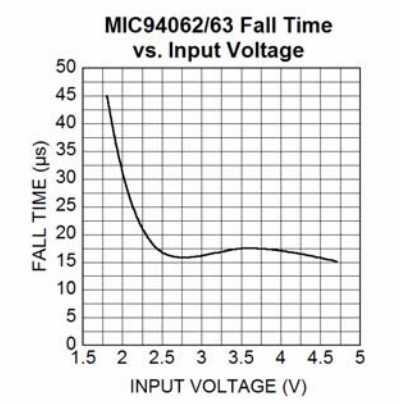

MIC94060/61 Turn-Off Delay vs. Input Voltage


MIC94060/61 Fall Time vs. Input Voltage


MIC94062/63 Turn-On Delay vs. Input Voltage

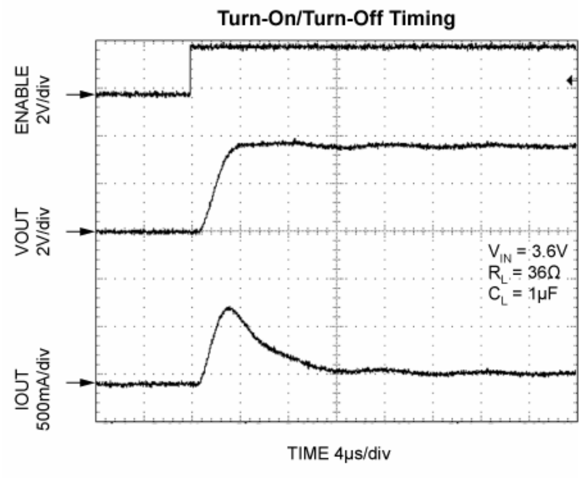

MIC94062/63 Rise Time vs. Input Voltage

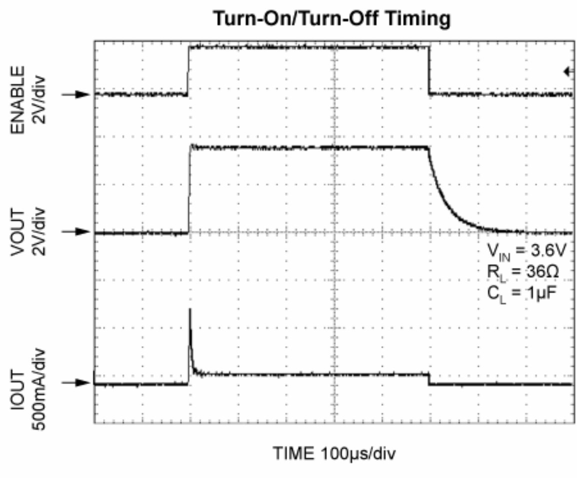

MIC94062/63 Turn-Off Delay vs. Input Voltage

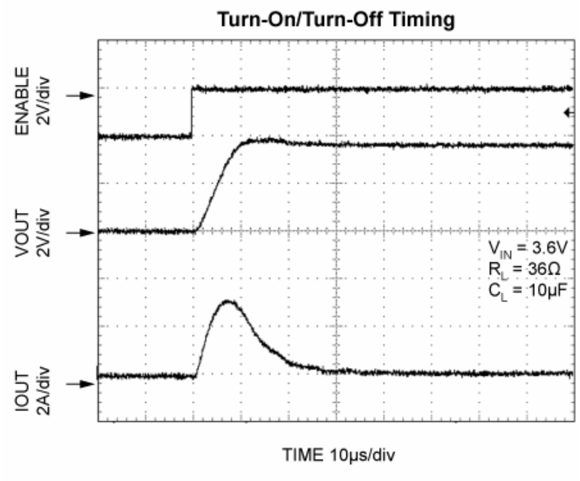

MIC94062/63 Fall Time vs. Input Voltage

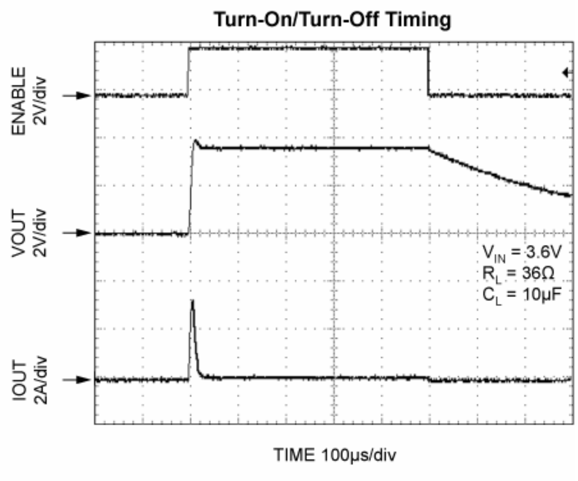
Functional Characteristics

MIC94060

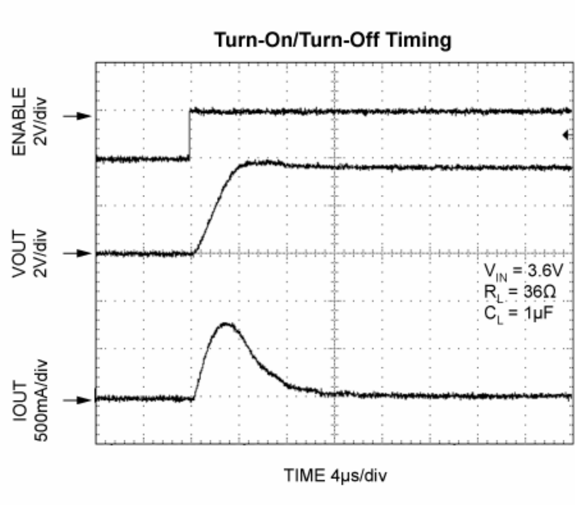


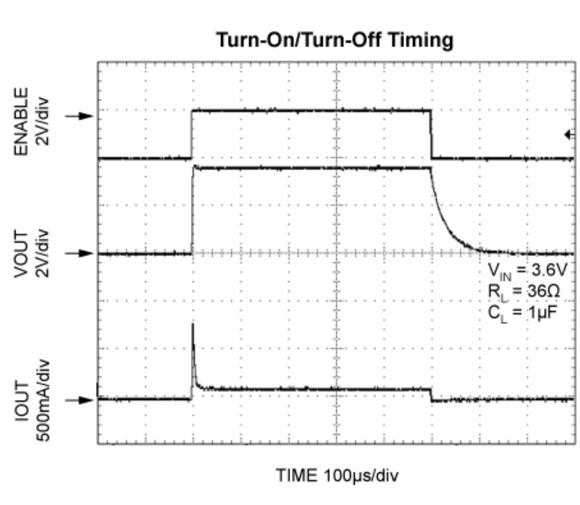


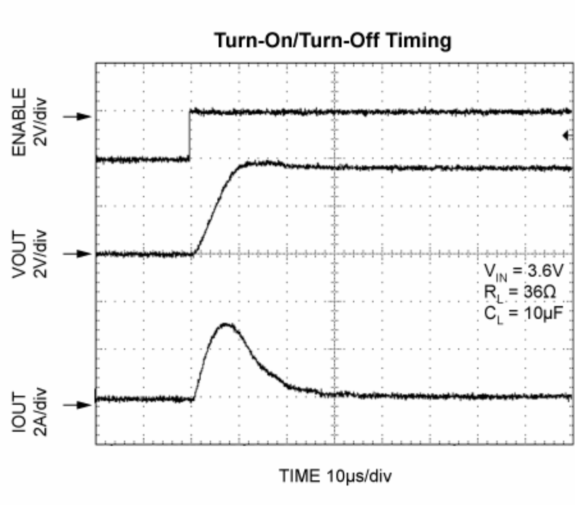


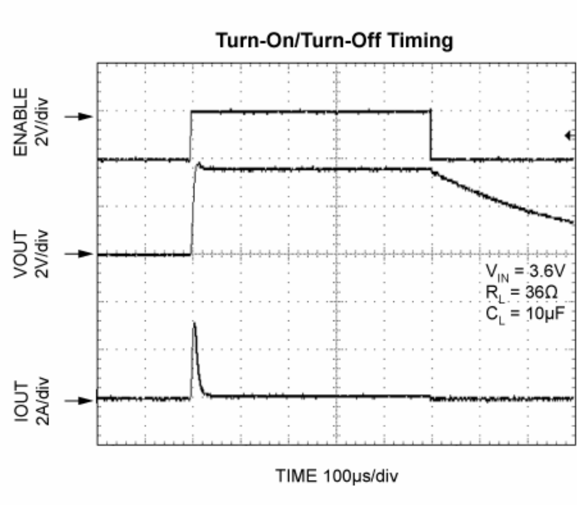


MIC94061

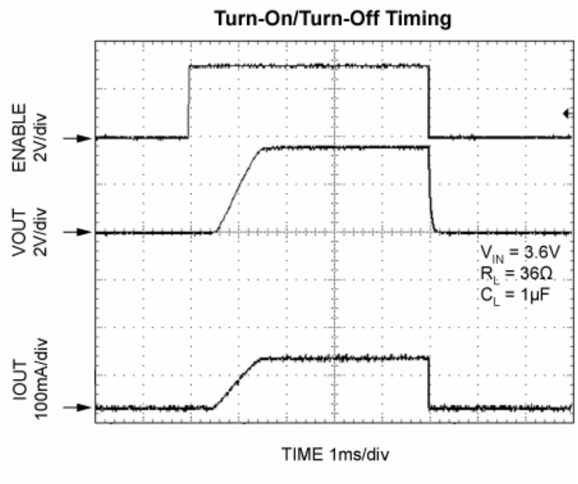

Turn-On/Turn-Off Timing

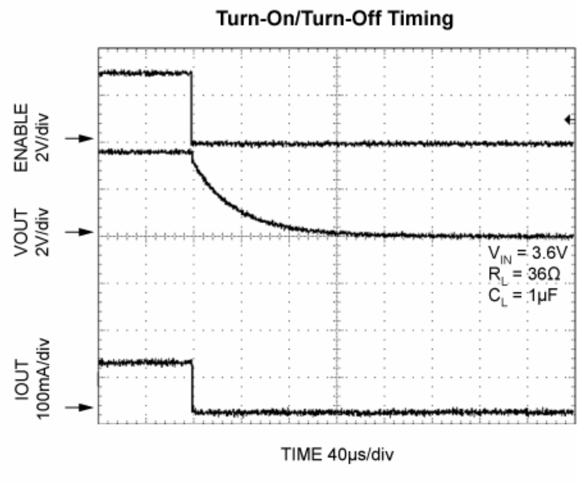

Turn-On/Turn-Off Timing

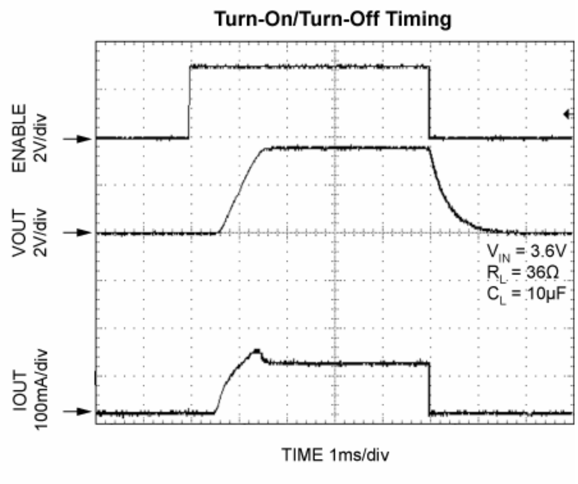

Turn-On/Turn-Off Timing

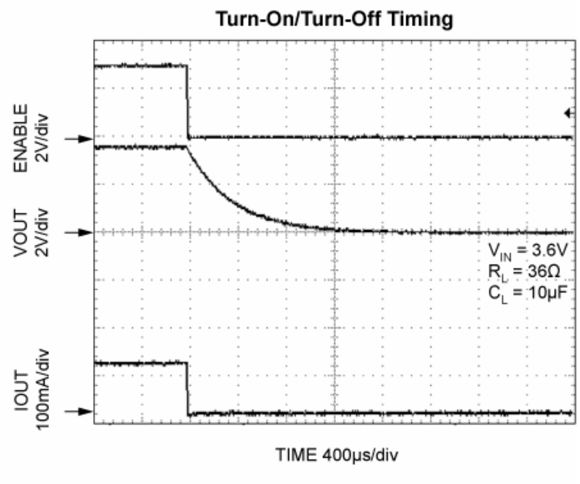

Turn-On/Turn-Off Timing

MIC94062

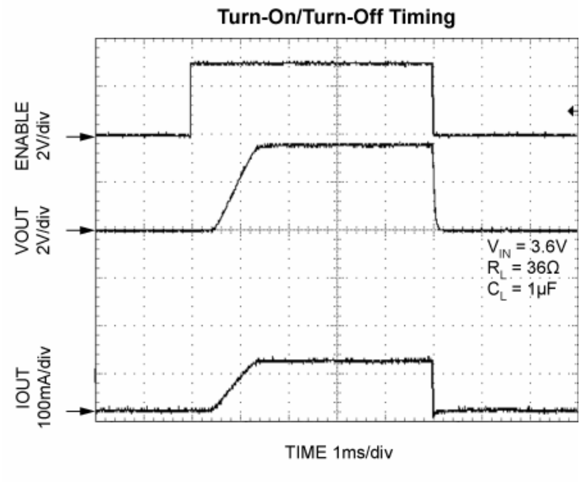

Turn-On/Turn-Off Timing

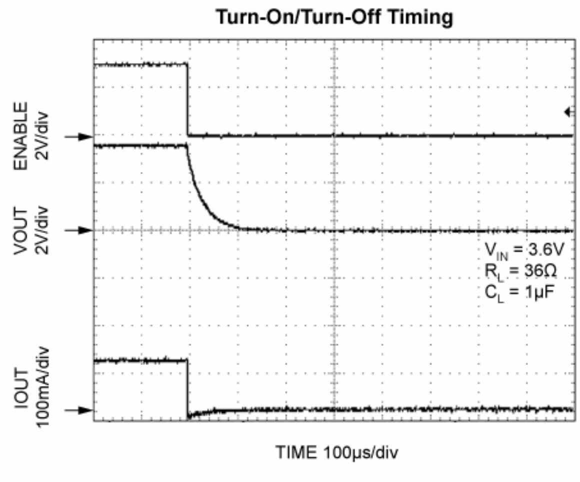

Turn-On/Turn-Off Timing

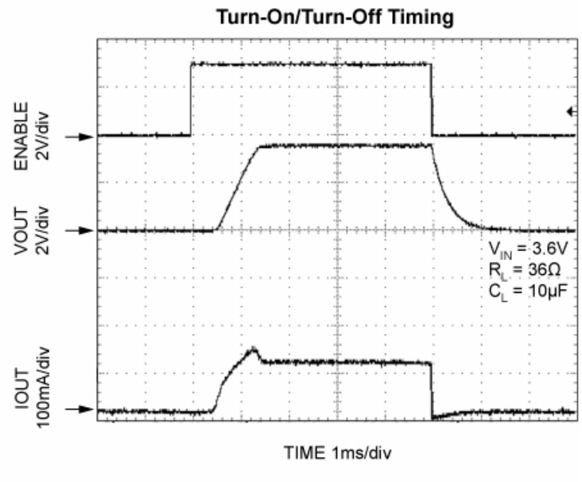

Turn-On/Turn-Off Timing

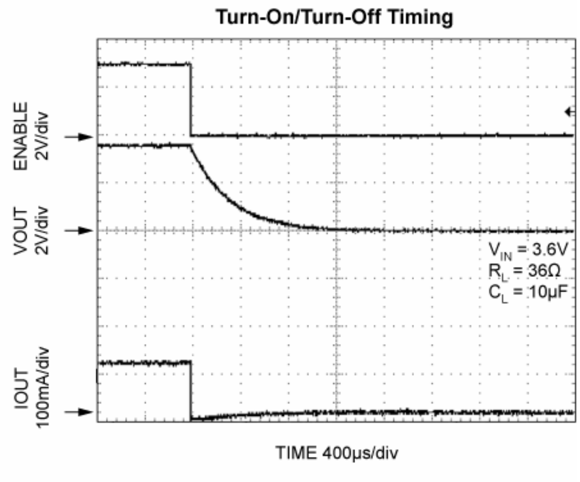

Turn-On/Turn-Off Timing

MIC94063

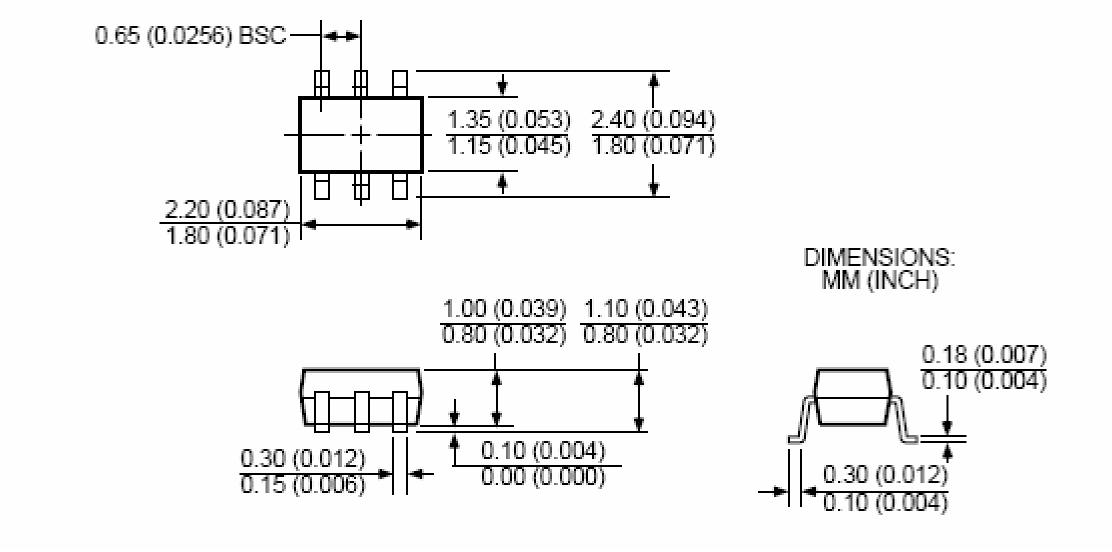

Turn-On/Turn-Off Timing
ENABLE 2V/div
VOUT 2V/div
IOUT 100mA/div
V_IN = 3.6V
R_L = 36Ω
C_L = 1µF
TIME 1ms/div


Turn-On/Turn-Off Timing
ENABLE 2V/div
VOUT 2V/div
IOUT 100mA/div
V_IN = 3.6V
R_L = 36Ω
C_L = 1µF
TIME 100µs/div

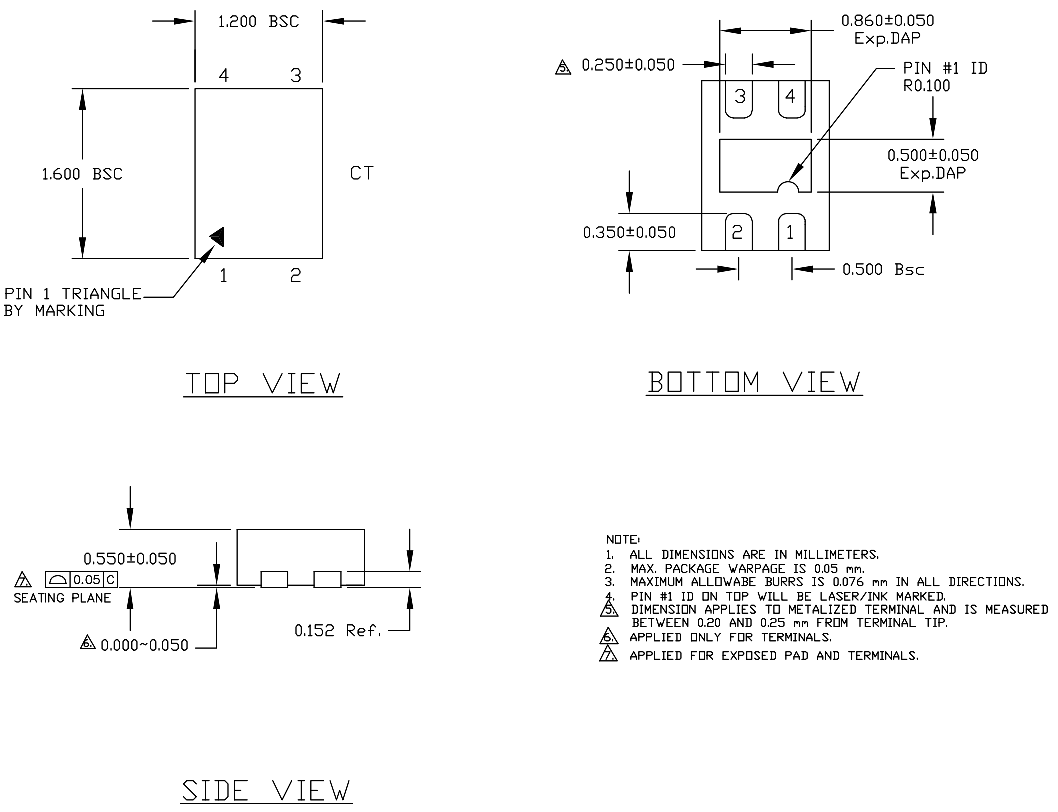

Turn-On/Turn-Off Timing
ENABLE 2V/div
VOUT 2V/div
IOUT 100mA/div
V_IN = 3.6V
R_L = 36Ω
C_L = 10µF
TIME 1ms/div


Turn-On/Turn-Off Timing
ENABLE 2V/div
VOUT 2V/div
IOUT 100mA/div
V_IN = 3.6V
R_L = 36Ω
C_L = 10µF
TIME 400µs/div

Package Information



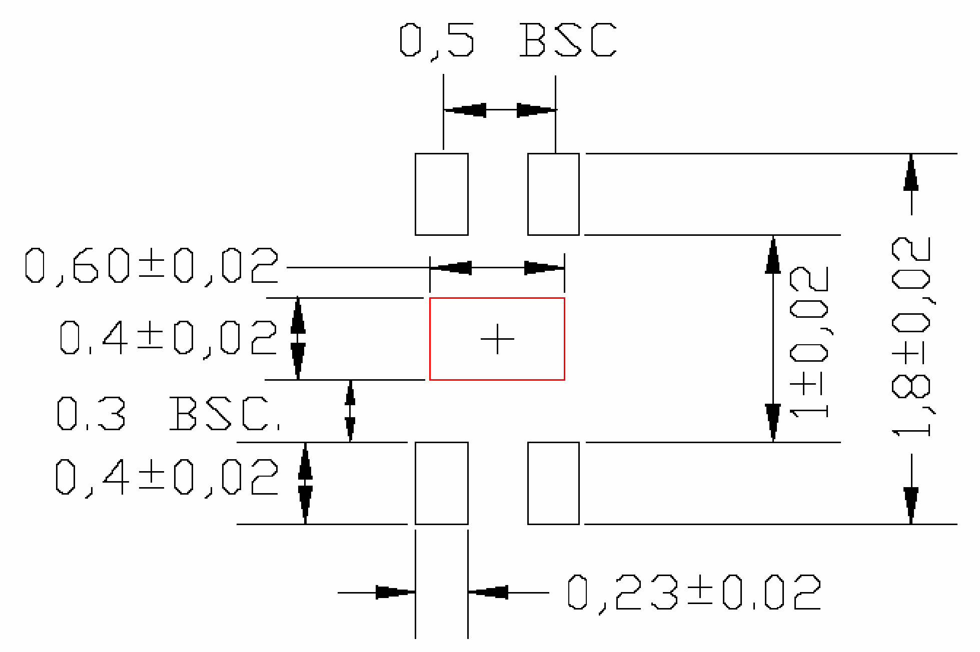
6-Pin SC-70 (C6)



NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. MAX. PACKAGE WARPAGE IS 0.05 mm.
3. MAXIMUM ALLOWABE BURRS IS 0.076 mm IN ALL DIRECTIONS.
4. PIN #1 ID ON TOP WILL BE LASER/INK MARKED.
5. DIMENSION APPLIES TO METALIZED TERMINAL AND IS MEASURED BETWEEN 0.20 AND 0.25 mm FROM TERMINAL TIP.
6. APPLIED ONLY FOR TERMINALS.
7. APPLIED FOR EXPOSED PAD AND TERMINALS.

4-Pin Thin MLF® (MT)

Recommended Land Pattern for MLF 1.2x1.6 4 Lead



Optional for maximum thermal performance. Heatsink should be connected to GND plane of PCB for maximum thermal performance.

Disclaimer: This is only a recommendation based on information available to Micrel from its suppliers. Actual land pattern may have to be significantly different due to various materials and processes used in PCB assembly. Micrel makes no representation or warranty of performance based on the recommended land pattern."

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