

DESCRIPTION

The NCM0350HV is a monolithic step-down switch mode controller with a programmable output current limit. It achieves continuous output current over a wide input supply range with excellent load and line regulation.

The maximum output current can be programmed by sensing current through an accurate input sense resistor.

It can output constant voltage. Internal thermal shutdown, cycle-by-cycle current limit protection.

The NCM0350HV requires a minimum number of readily available standard external components. The chip is available in 8-pin SOIC8 packages.

NCM0350HV, 降压PWM控制器, SOP8封装, MOS外挂;
高耐压到+90V输入, 0.8V的基准, 完善的短路保护电路;
支持低压输入 (+12V~24V), 6-8A大电流输出;
支持高压输入 (+75V~48V), 完美支持1.5A输出
可以广泛的用于电动汽车, 电动自行车, 电瓶车, 扭扭车, 卡车。

替代 MP4688, MP4689, XL7015, XL70XX 等

电流能做得比他们大很多, 系统更稳定, 不容易损坏。

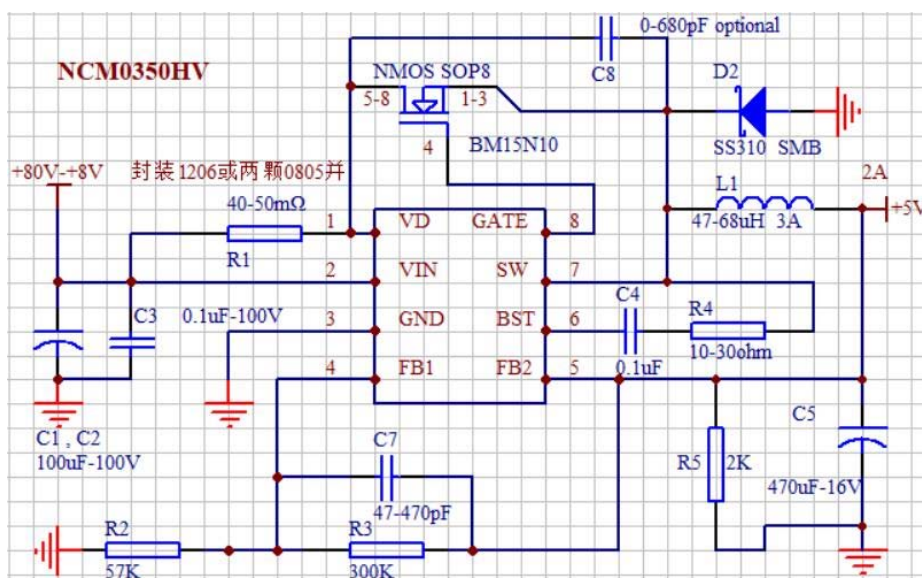
FEATURES

- ◆ Wide +8V to +85V Operating Input Range
- ◆ Programmable up to **8A** Output Current when 12V input.
- ◆ Output Adjustable from 0.8V to +35V
- ◆ Programmable Output Current Limit without power loss
- ◆ Outside Power MOSFET Switch
- ◆ Mature output short protection circuit
- ◆ 85% Efficiency @ 1000mA @ 9Vout when +75V input
- ◆ Fixed 200KHz Frequency
- ◆ Output up to 2A when +72V input
- ◆ Cycle-by-Cycle Over Current Protection
- ◆ Available in 8-Pin SOIC8 Packages

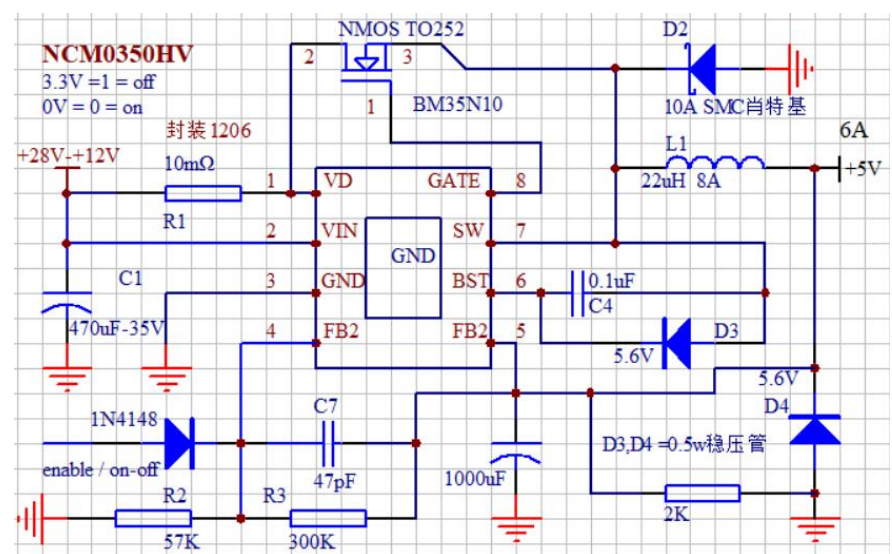
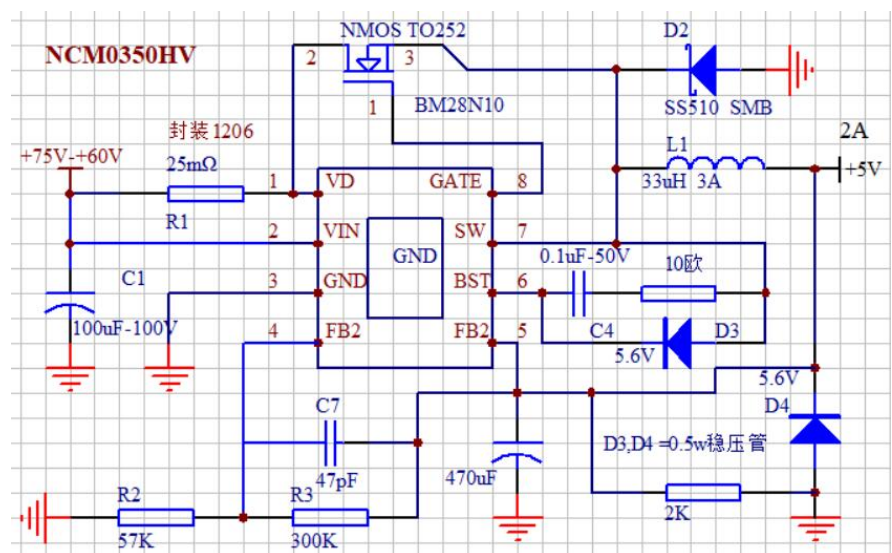
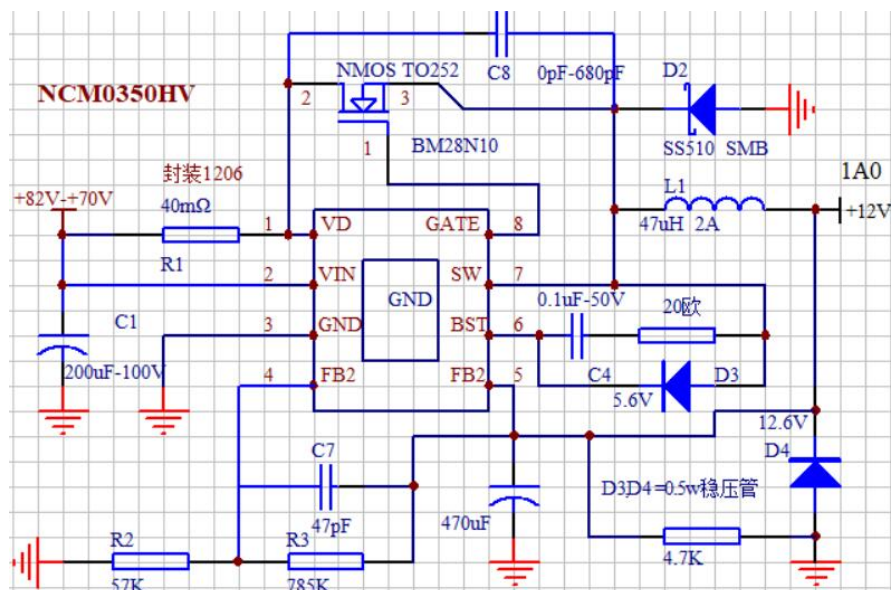
支持 USB 3.0, 3.1 支持 Type-C 对外充电

Support USB **Type-C** and USB 3.0, 3.1 charger

TYPICAL APPLICATION



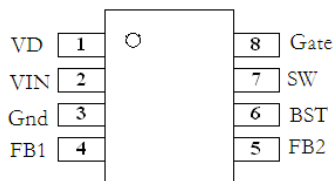
D3与D4起保护作用



ORDERING INFORMATION

PART NUMBER	NCM0350HV
TEMPERATURE RANGE	-40°C to 85°C
PACKAGE	SOP8

PIN CONFIGURATION

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

Supply Voltage V_{IN}	90V
V_{SW}	-0.3V to $V_{IN} + 0.3V$
V_{BST}	$V_{SW} + 6.0V$
V_{ISN}, V_{ISP}	0V to 15V
All Other Pins	-0.3V to +6.5V
Junction Temperature	150°C
Lead Temperature	260°C
Storage Temperature	-65°C to +150°C

Recommended Operating Conditions ⁽²⁾

Supply Voltage V_{IN}	+8V to 80V
Output Voltage V_{OUT}	0.8V to 30V
Output Voltage V_{OUT} ($V_{IN} \leq 16.5V$)	0.8V to ($V_{IN} - 3.0$)V
Operating Temperature	-40°C to +85°C

Thermal Resistance ⁽³⁾ θ_{JA} θ_{JC}

SOIC8	50	10	°C/W
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Notes:

- Exceeding these ratings may damage the device.
- The device is not guaranteed to function outside of its operating conditions.
- Measured on approximately 1" square of 1 oz copper.

PIN No.	PIN NAME	PIN DESCRIPTION
1,2	VD, VIN	Supply Voltage. It operates from +8V to +80V. Use a resistor between Vd and pin2 to limit current. C_{IN} is needed to prevent large voltage spikes at the input. Put C_{IN} as close to the IC as possible. It is also drain of the external power device and power supply for the whole system.
3	Gnd	Ground. This pin is the voltage reference for the regulated output voltage. For this reason care must be taken in its layout. This node should be placed outside of the D1 to C_{IN} ground path to prevent switching current spikes from inducing voltage noise into the part.
4,5	FB1, FB2	Feedback. FB1: An external resistor divider from the output to GND, tapped to the FB pin sets the output voltage via the 0.8V reference. FB2: detect the output voltage to stable the system.
6	BST	Bootstrap. This pin acts as the positive rail for the high-side switch's gate driver. Connect a 104 cap between this pin and SW.
7	SW	Switch Output. To the switching of the inductor together with the source of MOS
8	GATE	Drive the external switching NMOS gate

ELECTRICAL CHARACTERISTICS

$V_{IN} = 12V$, $T_A = +25^{\circ}C$, unless otherwise noted.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Feedback Voltage	V_{FB}	$8V \leq V_{IN} \leq 80V$	0.785	0.805	0.825	V
Feedback Bias Current	$I_{BIAS(FB)}$	$V_{FB} = 0.8V$		10		nA
Oscillator Frequency	f_{SW}	$V_{FB} = 0.8V$	175	200	225	KHz
Boot-Strap Voltage	$V_{BST} - V_{SW}$			6.4		V
Minimum On Time (4)	t_{ON}	$V_{FB} = 1V$		100		ns
Under Voltage Lockout Threshold Rising			3.0	3.3	3.6	V
Under Voltage Lockout Threshold Hysteresis			200			mV
Supply Current (Quiescent)		$V_{EN} = 2V$, $V_{FB} = 1V$		400	500	μA
Thermal Shutdown ⁽⁴⁾				160		$^{\circ}C$

Note:

4) Guaranteed by design

EFFICIENCY TEST 效率测试表:

INPUT	I _{out}	V _{out}	Efficiency
12V	1A	5V	87%
24V	1A	5V	85%
48V	1A	5V	81%
60V	1A	5V	79%
72V	1A	5V	77%
60V	1.5A	5V	80%
60V	2A	5V	80%
24V	1A	12V	93%
48V	1A	12V	91%
60V	1A	12V	89%
72V	1A	12V	88%

更换电感或其他 NMOS
就会测试到不同的效率

限流电阻对应的负载电流

INPUT	R1 (limit)	I _{out} (max)
12V	50mohm	1.34A
48V	50mohm	1.53A
72V	50mohm	1.61A
12V	75mohm	0.89A
48V	75mohm	0.95A
72V	75mohm	1.01A
12V	100mohm	0.64A
48V	100mohm	0.66A
72V	100mohm	0.74A

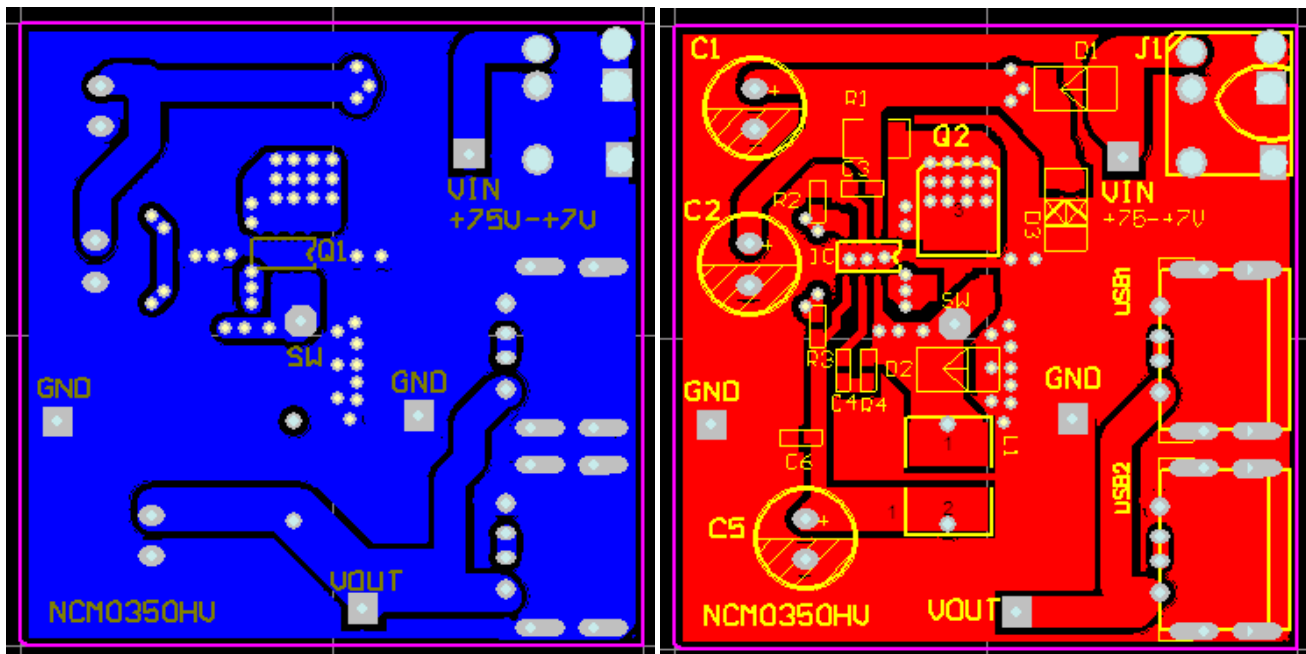
If the output current is over the current in the form, should modify the resistor to start up.

负载超过了表格中的电流,将不能带负载启动,必须改小电阻后才可以启动.

OCF 限流也是很好的电路保护措施,也对输出的短路保护电路有帮助.

APPLICATION and PCB reference:

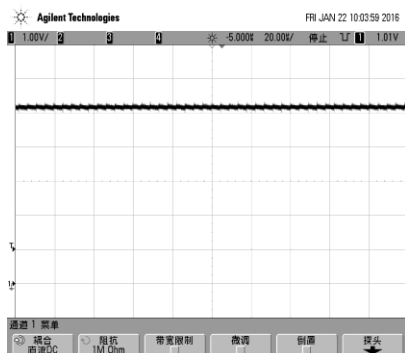
1. Put input capacitor close to NCM0350HV and larger than 100uF or 200uF if over 60V input.
尽量把输入电容靠近芯片输入脚,容量不小于100uF,如输入电压超过70V,最好在输入对GND加80V的TVS管,防止过冲.
2. Put Schottky diode close to SW and GND pin of chip, choose better heat-sink package like SMB or SMC.
尽量把肖特基二极管靠近芯片的SW脚与GND, 选择SMB或SMC等散热好的封装.电流耐压都要有20%以上的余量.
3. Choose high efficiency inductor, like the Iron-silicon-aluminum, or some SMT inductors.
尽量选择材质好点的贴片电感或铁硅铝电感.标称电流相对实际电流要有50%的余量.
4. The external NMOS, choose the Vds value 20V higher than the input voltage at least.
外置MOS的标称耐压要比实际的输入电压高20V,譬如输入70V, 选择100V的MOS.
5. The external NMOS, choose the I(D) value 8-12 times higher than the output current at least.
外置MOS的标称耐流要比实际的输出电流高8-12倍,譬如输出1A, 建议选择10A的MOS.
6. In order to reduce output ripple, the output capacitor should be larger than 220uF.
为了得到更好的输出纹波,输出电容别小于220uF.
7. In order to reduce the heat, use more ground area all around PCB.
为了得到更好的散热,PCB板上, IC的底部与周边空的地方,包括PCB 的正反面全部铺满地.
8. $V_{out} = 0.8V * (1 + R3/R2)$
 $R2 = 47K \sim 82K$
9. If need 5A-6A or 8A output when +12-24V input, should use the inductors strong enough, And also the external NMOS use the 75N60, the schottky should also choose the 10A or larger.
如果是12-24V输入, 输出5V,6-8A的应用, 除了电感有足够的余量,NMOS建议选用75N60,二极管要能达到接近10A.
10. C7 and R4 are also necessary for loop stable and EMC pass.
C7与R4也是环路工作稳定与过EMC必不可少的小贴片器件.
11. Here below the PCB reference, support both TO252 or SOP8 N-MOSFET.
如下是同时支持TO252与SOP8的NMOS的参考PCB图。



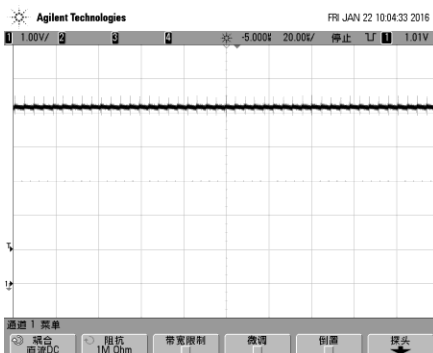
TYPICAL PERFORMANCE CHARACTERISTICS

C1=C2=100 μ F, C5=470 μ F, L=47 μ H, T_A=25°C, unless otherwise noted

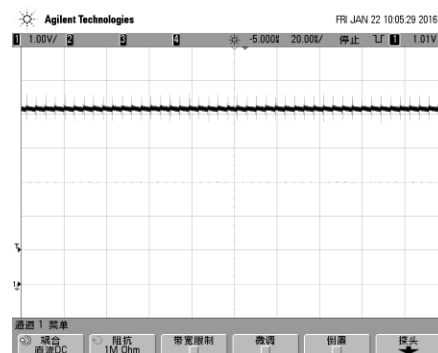
VIN=60V, VOUT=5V, Iload=0.5A



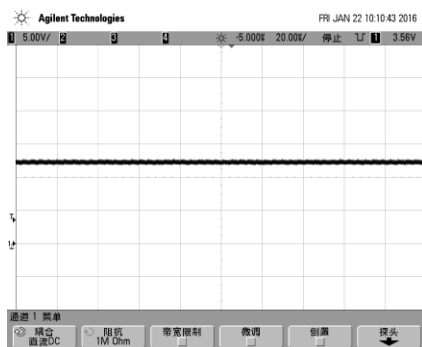
VIN=60V, VOUT=5V, Iload=1.0A



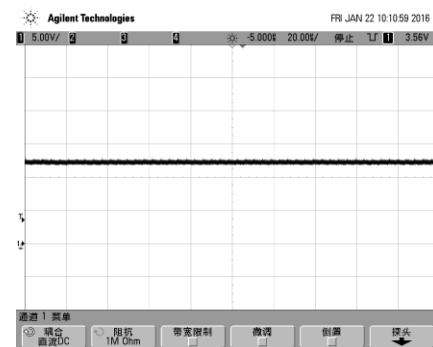
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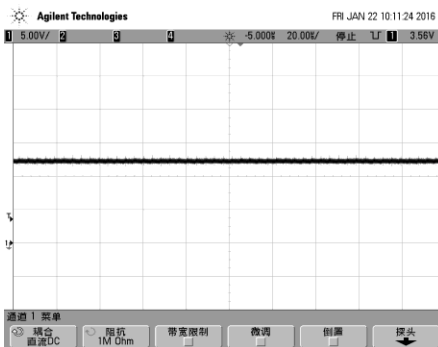
VIN=60V, VOUT=12V, Iload=0.5A



VIN=60V, VOUT=12V, Iload=1.0A

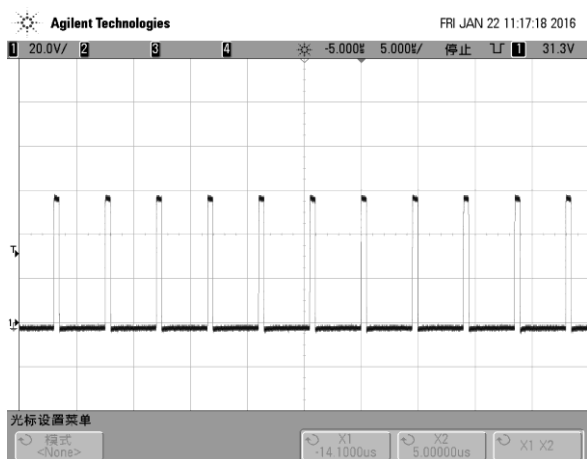


VIN=60V, VOUT=12V, Iload=1.5A



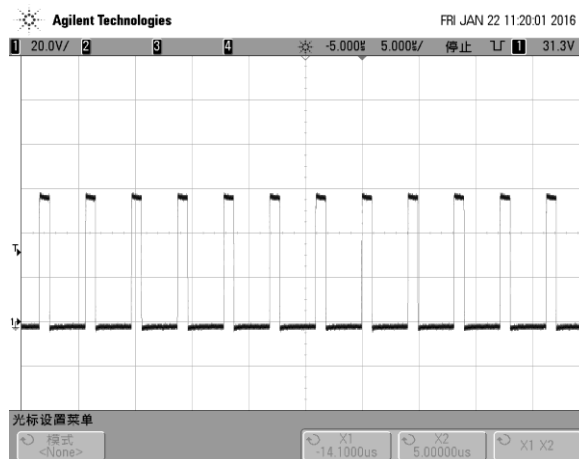
SW WAVE

VIN=60V, VOUT=5V, Iload=1.5A



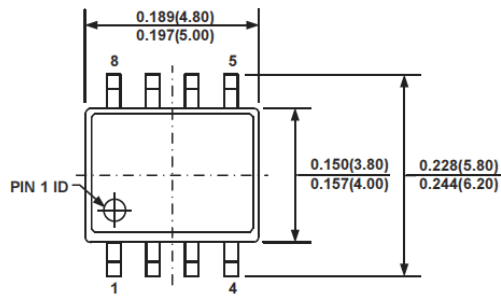
SW WAVE

VIN=60V, VOUT=12V, Iload=1A

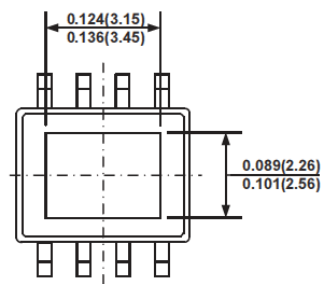


PACKAGE OUTLINE

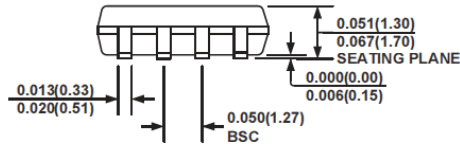
SOP8 PACKAGE OUTLINE AND DIMENSIONS



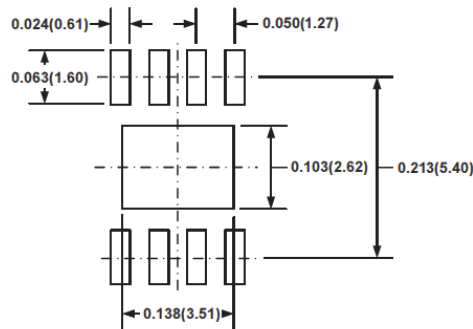
TOP VIEW



BOTTOM VIEW

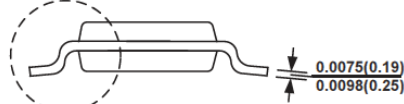


FRONT VIEW

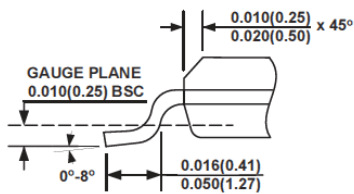


RECOMMENDED LAND PATTERN

SEE DETAIL "A"



SIDE VIEW



DETAIL "A"

NOTE:

- 1) CONTROL DIMENSION IS IN INCHES. DIMENSION IN BRACKET IS IN MILLIMETERS.
- 2) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- 3) PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS.
- 4) LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.004" INCHES MAX.
- 5) DRAWING CONFORMS TO JEDEC MS-012, VARIATION BA.
- 6) DRAWING IS NOT TO SCALE.