

4.4V-80V Vin, 1A, High Efficiency Synchronous Step-down DCDC Converter

IHD XUHV

BfR~~WU~~Wc2fe eZV2aaZReZ_d
 264 B BfR~~WU~~ ZeV7 ZXCVdf ad+
 5V ZVEV aVRef d/8 dUV +% 4e & 4
 2 SZ_e aVReZ_XEV aVRef d/CR_XV
 H ZV:_afeG dRXVCR_XV+%G) G
 4_eZf fd fæfe4fæV_e+ 2
 G 7WUSRT CWdV_TV G dRXVRe & 4
 :_d/XdReU D76Ed CUD_
 = dYf dJ _TfæV_e+ f2
 = BfZdTV_e4fæV_e+% f2
 Af dVD ZaZX UV AD Z=ZYe= RU
 2UfdRSV7dVbfV_T 9 e 9
 6 d/c_R 4 T D_TYc_ZReZ_
 d:_d/c_R D WdReEZ V
 A Vc8 U:_UZRe c
 CR_U DacVUDaVTæf æZ_WcdUf TVU6 :
 = 5c a fe7f_TeZ_R_U ZZ f _EZ V
 7f_TeZ_
 AdVTZ_6_RSVEYdY UWcRUfdRSV:_afe
 G dRXVF_UVcG dRXV= T feAc d/TeZ_
 FG= EYdY UR_U9 dæVdZ
 Dfaa ædææfa ZYadV SZdVU fæfe
 Vc dRXVR_U VcEV aVRef d/ Ac d/TeZ_
 6D A)=ART RXV

DSSOLFDCDC R CP FIGOXVEGFCC

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SECRET ONLY

HOHF UIFDOCFKDUDF HULV IFVC

G: . %G E. % 4 & 4 eaZR RfVZ e/d eUf_UVc & 4

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G:	aVReZ_XZafe eRXV		%%)	G
G: PFG=	:_afeFG= EYdY U 9 d e/d dZ	G: cZ_X	&& %	G G
:D95	DYf dJ _Tf cV_eW G: aZ	6 .	&)	2
:B	B f Z dTV_eTf cV_eW G: aZ	6 . G _ d ZY_Z 3 E DH . &G	%	2
:2TeZVP6G	2 TeZV Tf cV_eW G: aZ_Z 6G	G: . %G 6 . &G G FE. &G RU	%	f2

C5D P9	9ZY dZV D76E _ c/d dZ_R_TV	E . & 4	)	
		E . % & 4		
C5D P=	= dZV D76E _ c/d dZ_R_TV	E . & 4	%	
		E . % & 4		

Gc67	CWWcV_TV eRXV W73	E . & 4	**	G
		E . % & 4	*(&	

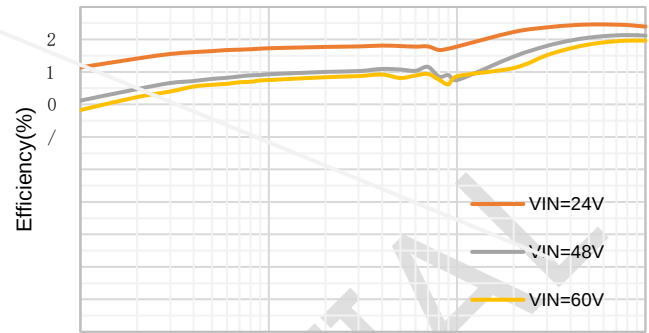
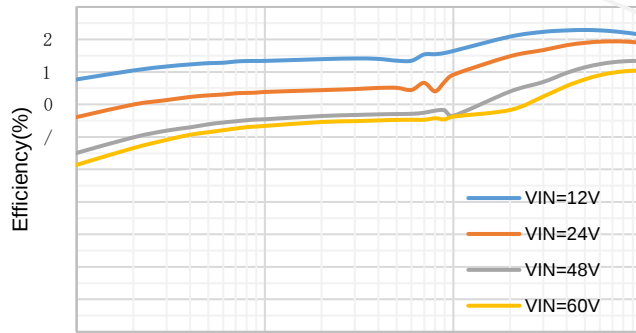
:=: P9D	9ZY dZV a Vc D76E aVR Tf cV e Z ZeYc/dY U		(	2
:=: P=DDC4	= dZV a Vc D76E d f cZX Tf cV e Z ZeYc/dY U		*	2
:K4	KVc Tc dd UVeTe ceYc/dY U			2
G9ZTf a	9ZTf a eZXVceYc/dY U eRXV 73 aZ		(&	G
eZTf aPUVR	5VR eZ V W9ZTf a eZXVc		&	T TV
eZTf aP RZ	9ZTf a ac eTeZ _e c_ W6Z V		)	d
:A62 <P :	ZZ f ZUf Te caVR Tf cV_e ReAD UV			2

G6 P9	6_RS VYZY eYc/dY U		& %	G
G6 P=				

G _{DJ 4P=}	CE $\frac{Z_{afe}}{R_{XV}}$ W V V		%&	G
e _P :	$\frac{Z}{Z} f \frac{W}{W} \frac{V}{V}$			$\frac{d}{d}$
e _{77P} :	$\frac{Z}{Z} f \frac{W}{W} \frac{V}{V}$		&	$\frac{d}{d}$
e ₅	R Z f $\frac{W}{W} \frac{V}{V} \frac{Z}{Z} = 5$ UV		&	f d
G _{A8PFG}	A $\frac{V_c X}{U} \frac{V}{V} \frac{f}{f} \frac{U}{U} \frac{V_c}{V_c} \frac{R_{XV}}{R_{XV}}$	POWER GOOD (% of FB voltage)	) *	
		POWER BAD (% of FB voltage)	) (	
G _{A8P G}	A $\frac{V_c X}{U} \frac{V}{V} \frac{f}{f} \frac{U}{U} \frac{V_c}{V_c} \frac{R_{XV}}{R_{XV}}$	POWER BAD (% of FB voltage)		
		POWER GOOD (% of FB voltage)		
G _{A8P= H}	A $\frac{V_c X}{U} \frac{V}{V} \frac{f}{f} \frac{U}{U} \frac{V_c}{V_c} \frac{R_{XV}}{R_{XV}}$	IPull-Up = 1 mA	) &	G
e _{8PUVR}	5VR $\frac{e}{e} \frac{V}{V} \frac{W}{W} \frac{V_c X}{V_c X} \frac{U}{U} \frac{d}{d} \frac{Z}{Z} \frac{R}{R}$		&	f d
C _{A8}	A $\frac{V_c X}{U} \frac{V}{V} \frac{f}{f} \frac{U}{U} \frac{V_c}{V_c} \frac{R_{XV}}{R_{XV}}$		) &	
G _{3 EFG}		3 E DH $\frac{W}{W} \frac{Z}{Z} \frac{X}{X}$	&	G
E _{D5}	EYVc R dYf $\frac{U}{U} \frac{e}{e} \frac{Y}{Y} \frac{d}{d} \frac{U}{U}$	E $\frac{d}{d} \frac{Z}{Z} \frac{X}{X}$	)	4
		9 $\frac{d}{d} \frac{e}{e} \frac{V}{V} \frac{d}{d} \frac{Z}{Z}$	&	4

5VcZVUW SV_TYTYRTe/cZReZ_

SIFDOFKDUUF HULV IFVC



Output Current(A)

Output Current(A)

7Zf dV 6WZ/T 7DH. % 9 G FE. &G

7Zf dV 6WZ/T 7DH. % 9 G FE. G

7Zf dV % = RU CVXf ReZ_ G. . %) G G FE. &G

7Zf dV & =Z_V CVXf ReZ_ G FE. &G := 25. 2

7Zf dV B f Z dTV_eTf αV_eGDEV aVdRef dV

7Zf dV (9D C5D GDEV aVdRef dV

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RSHUD IR C

EYVD4E) B ZR%%G) GZafe 2 fæfe6 :W/U d_TYc_fdSfT T_Væ/c ZYSfZeZ C Ud_
YZYdZVR_U C Ud_ dZV a Vc D76Ed :eZ aV V_dT_deWbfV_T aVR TfæV_e UV
T_æ e dXfRæV fæfe æXV

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H YV_ VcTfαV_e TTfαd TRfdZ_XRUVTcMRdV_Z fæfe eRXV

H YV_eVRS VT_UZ_dRdVdV WJ eV fæfe eRXV Z deZ_ZTcMRdVf_UVcd WdeRe 3feZdY f USV_eU
eYReZV fæfe eRXVUc adSV (& UfVe VcTfαV_e

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D76E d WR_U dZV a Vc D76E d _ 2 S eUZUV d Z_eXcReU _eVD4E) B UZ/e ZZ ZV
V e/c_R T a _V_eT f _a
EYVFG= WZY dZV D76E XRe/UcZVc YRd eYcY U WfRG H YV_eV eRXVRTc dd S e/cRa XReTz c f
Uc ad SV)G 3DE FG= TTf d eY eRXVReS e/cRa TRaRTz c d Zdf WZ/ee UcZV YZY dZV D76E
W _EYVT _Vc/cWcTVd e/c ZX _ dZV D76E aVcZUZR e dWVdYeV eRXV VS e/cRa TRaRTz c
e XfRdR_eV_eVT _Vc/cd W_TeZ _

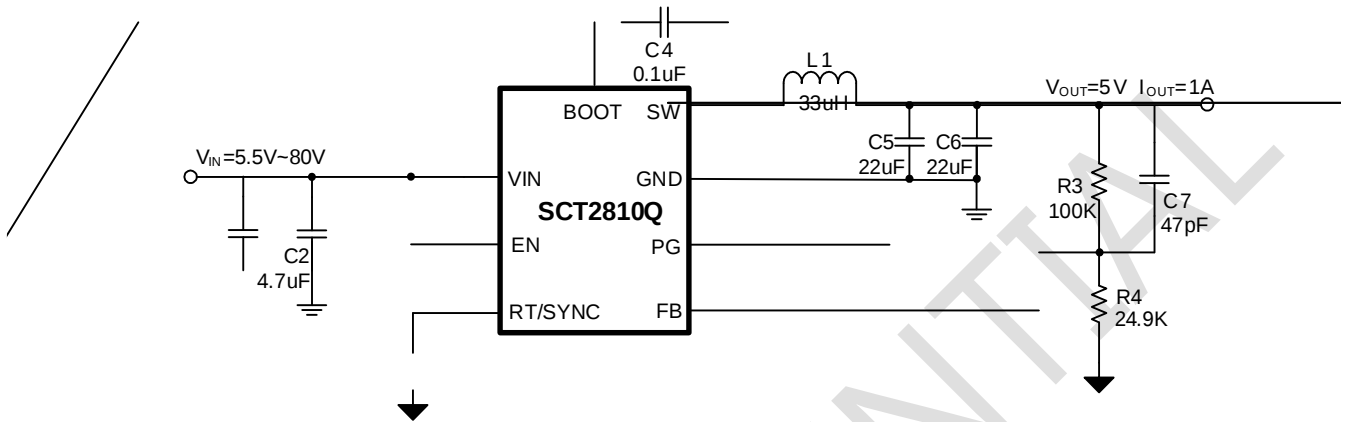
5

EYVD4E) B Z aV V_e eV Vc eRXV Ac e/Tz_ GATzf e e ZZ ZV faefe eRXV VdY eUf zX
RU eR_dZ_e dT VcZ_XW faefeVf eT_UZ_ cZYe RU eR_dZ_e EYV Vc eRXV T aRdRe cZ GA
Tzf eT aRdV eY 73 aZ eRXVe eY Z_e cR dWdV_TV eRXV H YV_73 eRXV V TMUd WZ_e cR
G dWdV_TV eRXV eY YZY dZV D76E f_c d W R Z faefe eRXV T_ezfVe ZTdV H YV_eY 73
aZ eRXV d SV WYV G dWdV_TV eRXV eY YZY dZV D76E TR f_c RXRZ

EYV A8 aZ d R_ aV URZ fafe 4 VTeeV aZ_e G FE c eVc eRXV d f dTV eVc f XYR af fa d dZ e c
Sve W_ R_U A RdV V df d eV Re eV eRXV T VT eU e eV A8 aZ_U Vd_e V TMU G
TV eV 73 aZ d Sve W_) * R_U WeV Z eVc R eRXV d W dV TV eV A8 5 aZ d UV R d dV eU R_U
eV aZ W Rd eY fd UVR EYV A8 aZ d af VU YV_eV 73 d VceR_)(cXc RdVceR_ WeV
ZR Z eVc R d W dV TV eRXV eY fd UVX eY Z X eZ V 2 d eV A8 d af W dGZ FG= ceVc R
dYf d R dV R d dV eU ceV 6 aZ af VU fafe eRXV V Tf dZ_d eV Re RdV dY eVceR_ fd UVX eY Z X
eZ VU e eZ eV A8 VRX

EYVD4E) B ac e/Te eYUV ZVW eYUR RXVuf cZXV TvddZVYPer_Ua VcUzdZReZ_T_UZ_d_TV
eV f_TeZ_e/ aVRe dV TMUd) 4 eVZe/c_R eVc R dV_d cde ad a Vc D76Ed d ZTYX H YV_eV
f TeZ_e/ aVRe dV d SV & 4 eYUV ZV c/dReZ ZYZe/c_R d WdReaYdV

DSSOLFD IR Q I RUP D IR C



:_afeG eRXV	% G c R & & G e) G
fæfeG eRXV	&G
R Z f fæfe4fαV_e	2
D æTYZX7c/bf V_T	% 9
fæfe eRXV æa V aVR e aVR	) G
EeR_dæ/eCVda_dV æ2 e (æ2 RUdæ/a	*) G

EYV fæfe eRXV d dVeS R_V e/c_R d/dZe cUZ JVc
 C R_U C% Z e aZR Raa dReZ dTYV ReZ
 CVT V_UVUC% d/dZeR_TV d %* FdV6bfReZ_ &
 e TRTf ReV C

G	&(	%*
&G		%*
G	(%	%*
%G	&(	%*

YVc/+
 Gc67 d eYV WUSRT dWcV_TV eRXV e aZR
 G

9ZYVcd dTYZXWbfV_TZ/d f aa æd R Vcac Wd W fæfeZUf Te d R_U fæfe TRaRTæ d d/d f eZXZ Vc
 eRXV R_U TfæV_e cæa Vd 9 V Vc eYV YZYVc d dTYZXWbfV_T TRfdVd V eR d dTYZX dd YZY
 U XdRUvdT Væ/cd VdR a VcWdZ_T R_U eYVc R aVdWc R_TV : eYd UVdZ_R UVReV d dTYZX
 WbfV_T W% 9 d dVVTæUe RTYZ/ VS eYd R d fæZ_dZVR_UYZYWdZ_T aVdReZ_

EYV d/dZe c T VTæU W CE DJ 4 e 8 5 dVæd
 d dTYZXWbfV_T VæVT Væ/c EYV d/dZe c RfV
 d/bf dUWcRUvdZUWbfV_T TR_SVTRTf ReUfdZX
 6bfReZ_ cUæ/c Z_UW W ERSV

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(& 9	%)
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9	(
9	&

YVc/+
 7DH d eYVUVdZU d dTYZXWbfV_T

EYVd/Rd/ dV VdR WTe d dY f U SV T dZVcMU Z dVVTæX ZUf Te c df TYRd ZUf TeR_TV dRe dReZ TfæV_e eYV
 C D TfæV_eR_U54 d/dZeR_TV 54C =RcXVcZUf TeR_TV d/d f æ Z Vdd ZUf Te c TfæV_e cæa VR_UeYVdWcV VRUd
 e Vc fæfe eRXV cæa V 9 V Vc eYV RcXVc RfV ZUf Te cR R d T æVda Ud e R SZXVc aY dZR dZV
 YZYVcdVcZ/d d/dZeR_TV R_U VcdRe dReZ TfæV_e 2 X Ud V WcUæ/c ZZXeYV ZUf TeR_TV e fdV d e R
 eYV ZUf Te caVR e aVR cæa V TfæV_ee SVRaac Z Re/ & WæV R Z f fæfe TfæV_e

EYV aVR e aVR cæa V TfæV_eZ eYV ZUf Te c:=AA TR_SV TRTf ReURd Z 6bfReZ_ (

H YVc/+
 :=AA d eYV ZUf Te caVR e aVR TfæV_e
 = d eYV ZUf TeR_TV WZUf Te c
 W d eYV d dTYZXWbfV_T

G_{FE} Z_{eV} f_ae_e R_{XV}
G: Z_{eV}Z_af_e R_{XV}

DZ_{TV}e_VZ_{Uf}T_ec_{Tf}α_Ve_ca_VZ_{Tc}R_dV_d Z_{eV}Z_af_e R_{XV} d_{eV} R_Zf_e Z_af_e R_{XV}Z_{Raa}Z_{ReZ}_ Z
R_Rd_fd_{VU}e_{TR}T_fR_e/e_V Z_Zf_e Z_{Uf}T_R_TV_db_fZ_UF_dV₆b_fR_{eZ}_) e_{TR}T_fR_e/e_VZ_{Uf}T_R_TV_Rf_V

H Y_Vd₊

= : Z_{eV} Z_Zf_e Z_{Uf}T_R_TV_db_fZ_U
W/ Z_{eV}d_ZY_ZX_Wb_fV_T
G_{FE} Z_{eV} f_ae_e R_{XV}
G: R_Z Z_{eV} R_Zf_e Z_af_e R_{XV}
: FE_R Z_{eV} R_Zf_e 54 R_UT_fα_V_e
=:C_ZT_WZ_U_e W_{=AA}e : FE

EY_Ve_R T_fα_V_e_W Z_Xe_Yc_fXY_{eV}Z_{Uf}T_ec_Ze_VZ_{Uf}T_ec_ca_VT_fα_V_e_af_de_V f_ae_eT_fα_V_e_HY_V_d_VV_Te_ZX
R_{_}Z_{Uf}T_ec_{TY}_d_VZ_dR_eU_{Tf}α_V_e_Vd_aV_TR_eV_dR_ef_dR_{eZ}_T_fα_V_e_Ro_XV_ce_R_Z_da_VR_aV_Re_Z_T_fα_V_e_RU
C_DT_fα_V_e_Rd_{_}e_{SV}V_TW_UU_{EY}V_dW_de_Va_VR_dZ_YZ_XT_fα_V_e_WZ_{Uf}T_ec_{:=A62<}R_U:=C_DT_R_S_V
TR_{Tf}R_eU_Rd_Z6b_fR_{eZ}_ * R_U6b_fR_{eZ}_

H Y_Vd₊

:=A62< Z_{eV}Z_{Uf}T_ec_aV_R T_fα_V_e
: FE_Ze_V54 R_UT_fα_V_e
:=AA_Ze_VZ_{Uf}T_ec_aV_R e_aV_R T_fα_V_e
:=C_D Z_{eV}Z_{Uf}T_ec_C D_{Tf}α_V_e

:_ V_cRU_ZX_cRU_aR_dZ_eT_UZ_de_VZ_{Uf}T_ec_aV_R T_fα_V_e_{TR}_Z_{Tc}R_dV_fa_ee_Vd_ZY_{Tf}α_V_e_ZZ_W
e_VUV_ZV_YZ_YZ_ea_ZR₍2_{EY}V_de_T_d_Vc_Re_ZV_Ra_cRTY_Ze_{TY}_d_VR_{_}Z_{Uf}T_ec_ZY_Rd_Re_fR_{eZ}_T_fα_V_e_Re_ZX_Xc_Re_Vc_eR₍2₃V_TR_fd_VW_eV_RZ_f:=A62<Z_ZU_SUV_ZV_eV_RZ_ff_ae_eT_fα_V_e_eV_Re_eV_D4_E)_BTR_{UV}Z_Vc_Rd_{UV}a_VU_d_e_VZ_{Uf}T_ec_{Tf}α_V_e_ca_VEY_fd_eV_RZ_fU_Vd_ZU_fa_ee_{Tf}α_V_e_Rd_RW_Te_de_Vd_VV_Te_Z_W_ZU_fT_R_TV_{EY}V_dR_Vc_ZU_fT_ec_dV_fe_dZ_Ro_XV_cZ_{Uf}T_ec_{Tf}α_V_e_ca_VVR_UZ_Xe_R

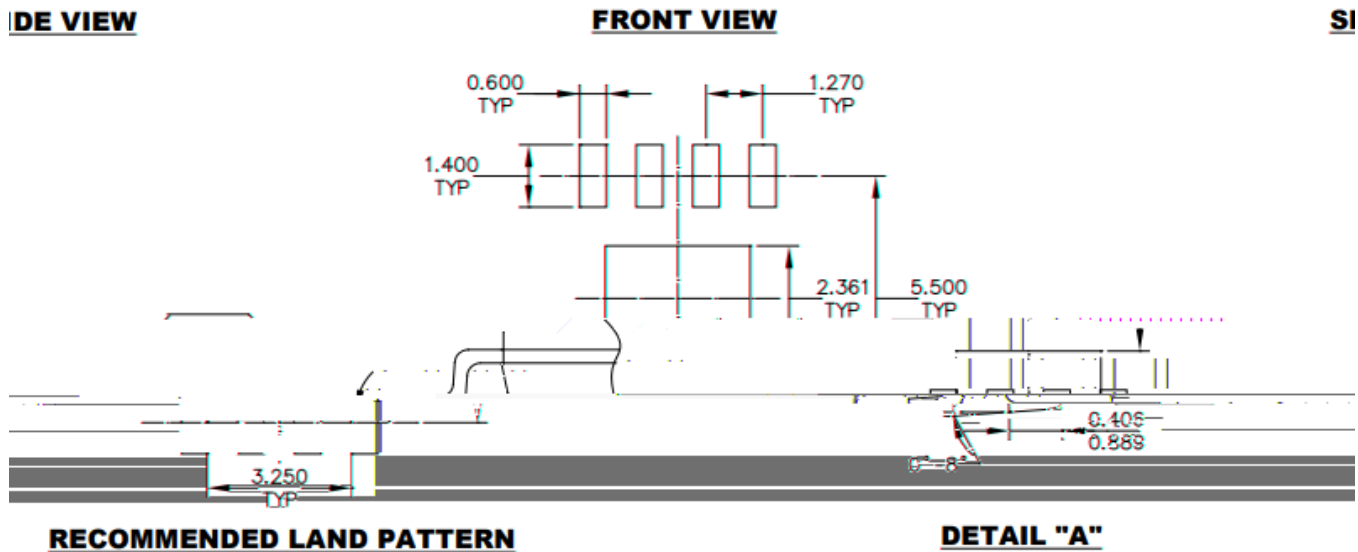
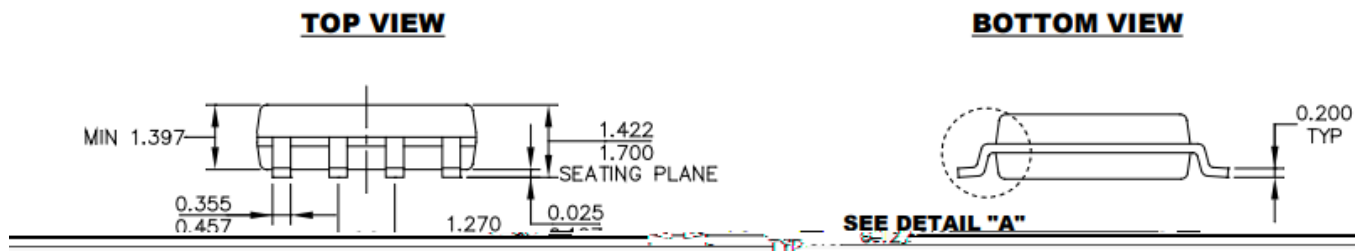
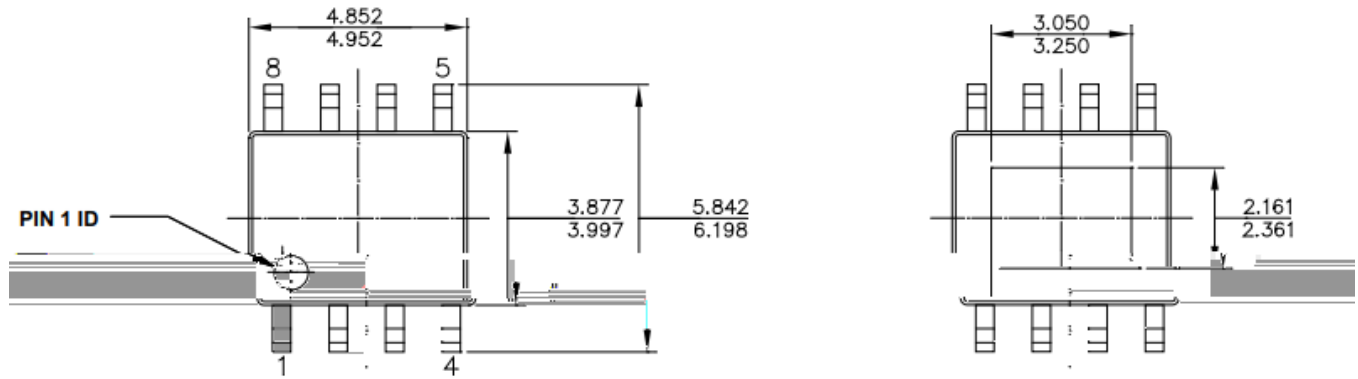
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NOTE:

- 1) ALL DIMENSIONS ARE 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 0.1 MILLIMETER MAX.
- 5) DRAWING REFERENCE TO JEDEC MS-012, VARIATION AA.
- 6) DRAWING IS NOT TO SCALE.

