

4.4V-80V Vin, 2A, High Efficiency Synchronous Step-down DCDC Converter

FEATURES

H ZV: afeG dRXV CR_XV+%G) G
 4_ezf fd fafe4fcd_et 2
 G 7WUSRT CWdV_TV G dRXV/Re & 4
 :_dXcRdU D76Ed (CUD _
 = dYf dJ _TfcdV_et f2
 = BfZdTV_e4fcdV_et f2
 Af dVD ZaZX UV AD Z=ZYe= RU
 2UfdRSV7dbfV_T 9 e & 9
 6_eVcR 4 T D_TYc_ZReZ_
 & d:_eVcR D WdReEZ V
 A Vc8 U:_UZRe c
 CR_U DacRU DaVTef aeZ_WcdUf TVU 6 :
 = 5c a feR_U ZZ f _EZ V7f TeZ_
 AcVTZ_6_RSVEYcdY UWcRUfdRSV:_afe
 G dRXVF_UVcG dRXV= T feAc dTeZ_
 FG= EYcdY UR_U9 dVcdVd
 Dfaa cdeRefa ZYacV SRdUJ fafe
 Vc dRXVR_U VcEV aVdRf dV Ac dTeZ_
 74EB7 & = ART RXV

APPLICATIONS

:_Uf dcaZ dR_da dReZ_
 H ZV/Vdd ZWRdof Tef dVR_U_Ve c ZX
 7RTe c Rfe ReZ_R_UT_ec
 6 VTecZ SZ T VdR_U 6 VTecZ dT dVd

DESCRIPTION

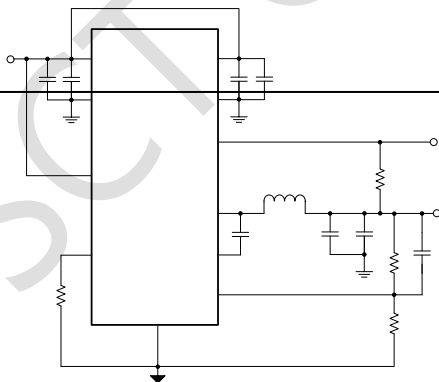
EYVD4E) Z 2 d_TYc_f dSfT T_VcdVd ZY
 ZV_Zafe dRXV dR_XZXW %%G e) G YZY
 Z_eVcRdR (YZYdZV D76E R UR
 dZV D76E EYV D4E) RU aeZX eV aVR
 TfcdV_e UV T_ec dfaa cd eV Af dV D ZaZX
 Uf ReZ_ AD ZY e aZR f2 bfZdTV_e
 TfcdV_e YZYRddZed eV T_VcdVc_RTYZ/ ZX YZY
 VWZ_T Re ZYe RU cdeR_US T_UZ_

EYVD4E) WRfdVdR_ZeVcR & dd WdReEZ V
 e R ZU RcXV_ZcdY TfcdV_e RU fafe dRXV
 VcdY eUf cZX dRefa EYVd ZYZXWbfV_T TR_
 SV RUfdUW 9 e & 9 EYV D4E)
 Z_eVcRd=5 W_TeZ_R_U ZZ f _eZ VW_TeZ_
 d ZTR_dfaa c_R aVdReZ_ZYZ_R ZVdR_XV
 WUfe TTVd

EYVD4E) ZR_6 VTec RX_VeZ:_eVcdV_TV 6 :
 WZ_U SfT T_VcdVc ZY Z a V V_eZX aeZ ZVU
 UVdZ_Wc 6 : dUfTeZ_EYV D4E) WRfdVd
 7dbfV_T DacRU DaVTef 7DD fdVd R
 adVfU dR_U WbfV_T YaaZX ZY) ZVcZX
 daR_WeV d ZYZX WbfV_T e dUfTV eV
 T_Uf TeU 6 :

EYV D4E) Wcd TTVS TTV TfcdV_e Z ZR_U
 YZTfa Vc TfcdV_e ac dTeZ_eVcR dYf dJ_
 ac dTeZ_fafe Vc dRXV ac dTeZ_R_U_Zafe
 dRXV_f_UVc dRXV ac dTeZ_EYV UV ZV Z
 R RZRSVZ_74EB7 & = aRT RXV

TYPICAL APPLICATION



4.4V-80V, Synchronous Buck Converter

Efficiency, F_{SW}=400kHz, V_{OUT}=5V

REVISION HISTORY

E6+ARXV_f SVd Wcad/ Zfd d/ dZ_d R UZVcW aRXV_f SVd Z_eV Tf dV_e VdZ_ CV dZ_)+4fde VcDR aVd

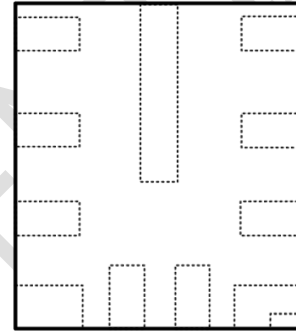
DEVICE ORDER INFORMATION

D4E) 7B4C	ERaV CW	&	)		74EB7 & =	E35
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ABSOLUTE MAXIMUM RATINGS

Vc aVReZ_XWVRZd/ aVReZ_d/f Vdd eVc dV dU			
G: 6		) &	G
3 E		*	G
DH		) &	G
DH - _d		) &	G
3 E DH			G
73 CE			G
A8			G
aVReZ_X f_TeZ_e/ aVReZ_d/E %	%	&	4
De dRXVd/ aVReZ_d/EDE8	&	&	4

PIN CONFIGURATION



- (1) DecVdVd SV_UeY dV dUf UVc2Sd f d/ R Z f CRZ_X R TrfdVUV dV aVc R_V_eUR RXV EYVUV dV d_eXfRd_dUe W_TeZ_f dZV Wd CVT V_UU aVReZ_4_UZ_d
- (2) EYV R G: dR dZ_e dRXV dXfRd dUJS_UVdZ_R_U VcZU_SV TY
- (3) EY dRaa d d e dV dZ_X dRXV XV_VReU_S dVW_eV_eVc_R Raa dU dRXV
- (4) EYV:4 ZTfUd VceV aVReZ_d/ac dTeZ_e ac dTeVUV dVUf dZ_X Vc RU_T_UZ_d f_TeZ_eV aVReZ_d Z V_TWU & 4 YV_VceV aVReZ_d/ac dTeZ_d RTeZ_V_4_eZ_f d W_TeZ_RS VeVdaVT dU R_Z f aVReZ_X f_TeZ_e/ aVReZ_d Z dUf TV dV dZ V

PIN FUNCTIONS

A8 5		: dVc R a VcXc f_U 4 __VTe d d d/ Xc f_U = Z aUR_TV_T__VTeZ_f deSV ac dUe A8 5 4 __VTeR YZYbfR S aRdd TRaRT c c TRaRT d W eY d aZ_e G:
G:		: _afedfaa e eYV T _VdVc 4 __VTeR YZYbfR S aRdd TRaRT c c TRaRT d W eY d aZ_e A8 5 = Z aUR_TV_T__VTeZ_f deSV ac dUe G:
3DE		A Vcdf aa S dWc YZY dZV a Vc D76E XReVUcZVc 4 __VTeR f 7 TRaRT c W 3 E aZ_e DH aZ_3 d dRa TRaRT c d TYRcXU YV_DH dRXV d
A8	%	aV_UdZ_a VcX U VRX fafe 4 __VTe R df dRSV dRXV df aa eYc fXY R Tf dV_e Z dZ_X d dZ_e c 9ZY. a Vc < . a VcSRU EYVVRXaf d YV_6 . eTR SV Wd aV YV_efdU
73	&	: _VdZ_X Zafe WdV dR_d T_Uf Td_TV Vc cR a dVc EYV dRa Wd_eVc_R WUSRT d dZ_e cUZ dVcW eYV fafee 8 5 dVd eYV fafe dRXV EYVUV dV dXf Rd d 73 dRXVe dV Z dVc R dWd TV RfV WGe aZR
28 5		2_R XXc f_U dZ_XV a ZeT __VTeZ_e A8 5 cd d d/ Xc f_U

CE	(	DVeeVZe/c_R dTZRe cT T WbfV_T cd_TYc_ZVe R_Ve/c_R T T 4 __VTe R dVdZe cW eYd aZe Xc f_Ue dVed ZYXWbfV_T 2_Ve/c_R T T TR_SV ZafeUZVTe e eV CE aZ_EYV Ze/c_R dTZRe cd_TYc_ZVde eV V_e/c_R T T WbfV_T ZY A== :WVVe/TeUT T ZXVUXVd de a eV aVReZ_ UVRfe ReZR dVf c d e dVdZe cac XdR VUWbfV_T
6	)	6_RSVZafee dXf Re c 9ZY. . 77 4R_SVT __VTeUUZVTe e G: EYV eRa WdZe cUZZVcW G: e 8 5 T __VTeX6 aZ_TR_RUfdeeVZafe eRXV T feeYcdY U 5 __eWRe
G:	*	:_afedfaa e eV T _Vd/c 4 __VTeR YZYbfRZ S aRdd TRaRTZ c c TRaRTZ cd W eYd aZe A8 5 = Z aMUR TVT VTeZ fdeSVac ZMUe G:
A8 5		:_e/c_R a VcXc f_U 4 __VTe d dV/ Xc f_U = Z aMUR TVT VTeZ fdeSV ac ZMUe A8 5 4 __VTeR YZYbfRZ S aRdd TRaRTZ c c TRaRTZ cd W eYd aZ e G:
DH		CVXf Re cd ZYX feafe 4 __VTeDH e R_Ve/c_R a VcZUf Te c

RECOMMENDED OPERATING CONDITIONS

Vc aVReZXWVRZe/ aVRe dV dR XVf Vdd eVc ZV eU

G:	:_afe eRXV dR XV	%%	)	G
G FE	fæfe eRXV dR XV		%	G
E	aVReX f _TeZ_ e/ aVRe dV	%	&	4

ESD RATINGS

G6D5	9f_R_3 U UV 93 aVc2 D: 6564 D %daVTZReZ R aZd			G
	4 YRcXU 5V ZV UV 45 aVc2 D: 6564 D %daVTZReZ R aZd			G

THERMAL INFORMATION

C 2	f _TeZ_ e R SZ_eeVc R dVdZeR_TV	E35	4 H
E	f _TeZ_ e e a TYRdTe/cZReZ_ aRdR Vd/c	E35	
3	f _TeZ_ e S RdJ TYRdTe/cZReZ_ aRdR Vd/c	E35	
C 4e a	f _TeZ_ e TRdVeVc R dVdZeR_TV	E35	
C 3	f _TeZ_ e S RdJeVc R dVdZeR_TV	E35	
C 2P6G	f _TeZ_ e R SZ_eeVc R dVdZeR_TV 6G	E35	
EP6G	f _TeZ_ e e a TYRdTe/cZReZ_ aRdR Vd/c 6G	E35	

D4E ac ZVd C 2RUC 4 f SVd _ Rd dWdV_TVe VdZ Re/ f _TeZ_ e/ aVRe dV VdVUV ZVd C 2RUC 4 RdV_eR
TYRdTe/cZReZ VdRT RXV ZVWSfe W R_ eVcd dV/ V V TYRdTe/cZReZ df TYRd eV/UvdZ_R U R fe VdV acZ eU TZf Z
S RdJ A43 _ YZYeVD4E) Z f_eU eVc R aRU dZV R UV_e/c_R V _Z_ V dR VTe cd EYV A43 S RdJ Z R YVRedZ
eVReZ d UVdUe eV VRUd VdV/D4E) 4 YR_XZ_XeVUVdZ_ cT _VZf dReZ_ VdV A43 S RdJ TYR_XVd eV VdV_Z_T VdV
YVRedZ_R UeVdWdVeVVRfR C 2RUC 4
VRdf dU _6D5& (%R VcA43 EYV RfVd XZV_Z eYd eSVRd/ _ RZJWcT aRcZ_ ZY eVcaRT RXVd R_U TR_ e
SVfdVUWcUvdZ_ afca dVd EYVdV RfVd Vd TRf ReU Z RIT dUR_TV ZY 6D5& (R_UdZ f ReU _RdaVTZU 6564
S RdJ EYV U _edVdV_eeV aVdVc R_TV SRZ_WZ_R RTf R Raa ZReZ
VRdf dU _D4E dR URdU 6G +D4E) 5V 3 RdJ f dVc R Vc _R_UZ_Vc R Vc & T aaVceYZ _Vdd (& . &
%R VcA43

ELECTRICAL CHARACTERISTICS

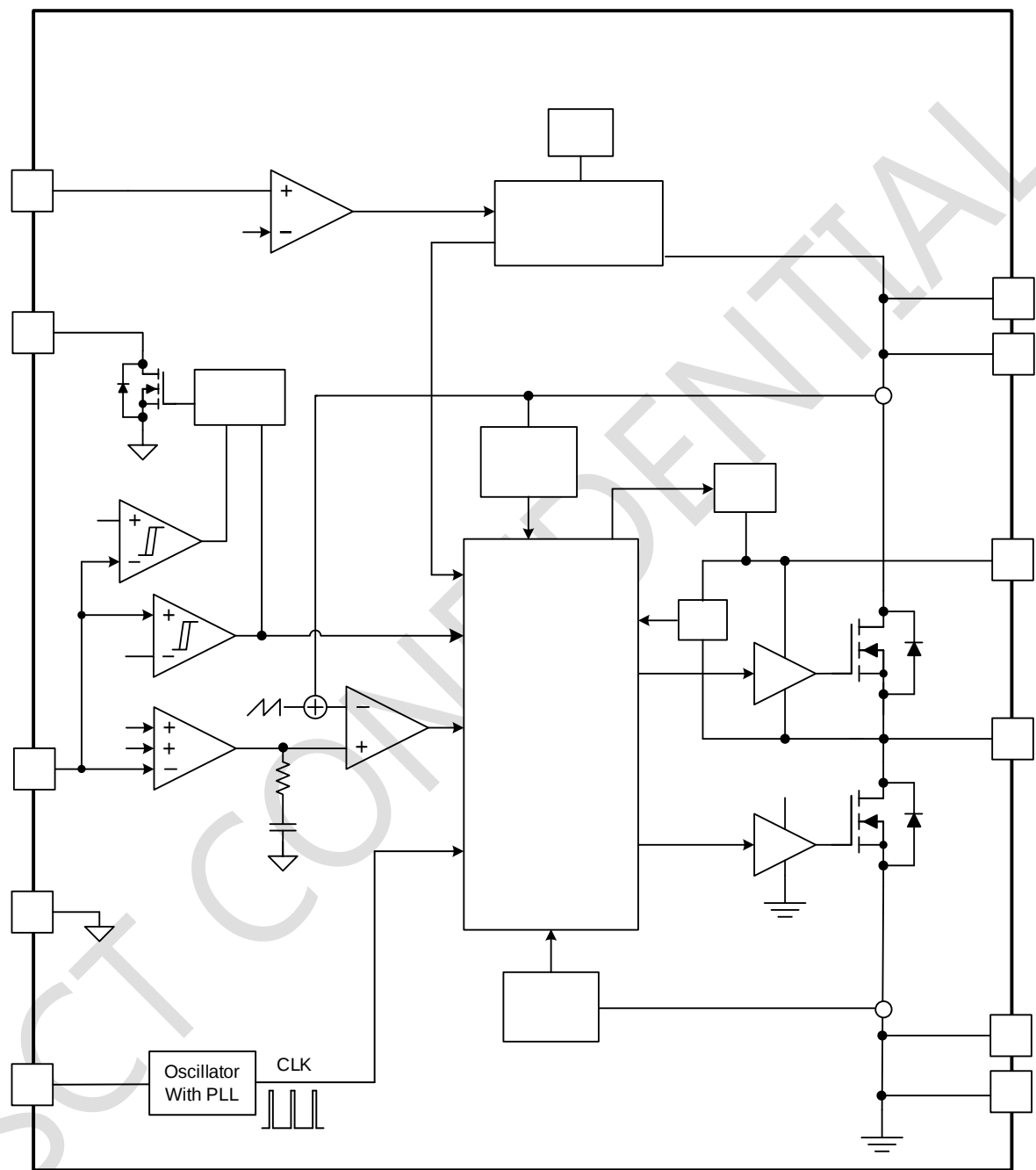
G: . %G E . % 4 & 4 e aZ R R f V Z e / d e U f _ U V c & 4

G:	aV R e Z X Z a f e e R X V		%%)	G
G: PFG=	: _ a f e F G = E Y d d Y U 9 d e V d d Z	G: c Z X	&& %%	G G
:D95	D Y f d _ T f a V _ e W G: a Z	6 . G		2
:B	B f Z d T V _ e T f a V _ e W G: a Z	6 . G _ _ d Z I Y Z X 3 E D H . & G		2
:2TeZVP6G	2 T e Z V T f a V _ e W G: a Z	G: . % G 6 . & G G F E . & G R U	%&	f2
C5D P9	9 Z Y d Z V D76E _ d d Z e R T V	G3 E G d H . % G	(	
C5D P=	= d Z V D76E _ d d Z e R T V			

Gc67

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FUNCTIONAL BLOCK DIAGRAM

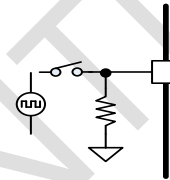


7Zf d\) 7f _TeZ _R 3 T 5 BXdR

SCTC

H YV_ VcTf αV_e TTf α TRf dZXRUVTdVRdV_Z fæfe eRXV
H YV_eVRS VT_UZ_dRdVd WU eV fæfe eRXV ZdeZ_ZTdRdVf_UVcd WdRæ 3feZdY f USV_eU
eReZ_eV fæfe eRXVUc adSV (& UfVe VcTf αV_e YZTf a ZSVæZXXVdU

EYVd_ZTYZXWbfV_T WëV D4E) Z dVeS aRTZX R dVdZe cSve W_ CE DJ 4 aZ_R_U eV Xc f_U c
d_TYc_ZZXe R_V_ê/c_R T T
:_ dVdZe cdVæZXWbfV_T UV R dVdZe caRTVU SVe W_ CE DJ 4 aZ_e eV Xc f_U dVæ eV d_ZTYZX
WbfV_T VcR_ZVdR_XVW 9 e & 9 EYVCE DJ 4 aZ_e eRXV_ZeaZR G CE DJ 4 aZ_Z_e
R_WUe SV WWRæZX cdY æUe eV Xc f_U FdV 6bfReZ_% cëV a eZ_7Zf dV_e UVê/c_ZV eV
dVdZeR_TVWcRd_ZTYZXWbfV_T_VUWU



YVd 7d_Zd_ZTYZX T WbfV_T

7Zf dV DVæZX7dVfV_T R_U
4 T D_TYc_ZReZ_

:_T T d_TYc_ZReZ_ UV eVd_ZTYZXWbfV_T d_TYc_ZVde R_V_ê/c_R T T Raa_ZUe CE DJ 4 aZ
EYVd_TYc_ZReZ_WbfV_T dR_XV_ZW 9 e & 9 R_UeVcæZXUXV WëV DH d_TYc_ZVde eV
W_ZX UXV WëV V_ê/c_R T T Re CE DJ 4 aZ_Ze aZR_d eZ_VUVR 2 dbfRdV R_V T T dZ_R e
CE DJ 4 aZ_fdeYR VYZY V V_VceR_ (&G V V_YZYVceR_%&G R_Uaf dV_ZeY RcXVceR_
_d

:_Raa_ZReZ_d YVd/S eY dVdZe cdVæZXWbfV_T UVR_UT T d_TYc_ZReZ_ UVRcV_VUWU eVUV_ZV
TR_SVT_Wf dU Rd dY_Z_7Zf dV_3WdV R_V_ê/c_R T T Z adV_e eVUV_ZV_c d_Z dVdZe cdVæZX
WbfV_T UV H YV_R_V_ê/c_R T T Z adV_eU eVUV_ZVRfe ReZR æR_dZ_dW_cVdZe cdVæZX
UVe V_ê/c_R T T d_TYc_ZReZ_ UV_2_Zê/c_R aYRdV_TW a A== T d_Zê/c_R T T WbfV_T
_e eV V_ê/c_R T T_ZYZ_e aZR & fd EYVT_VæVcæR_dZ_dW_eVT T d_TYc_ZReZ_ UVe eV
dVdZe cdVæZXWbfV_T UV_YV_eV V_ê/c_R T T UZRaaVRd

E dUfTV6 : eVD4E) Z aV V æ 7dVfV_T DacRU DaVTæf 7DD EYVaf ca dV WdæRU daVTæf_Z
e_VZ_ZReV aVR_V_ZdZ_d Re daVTæf_WbfV_TZ_d S_dacRUZX eVdV V_ZdZ_d RTc dd R_ZVc dR_XV W
WbfV_TZ_d dReVc eYR_Rææ_ZY_WU WbfV_T_W_TæZ_:_de d dV_d T_eRZZX eV D4E)
WbfV_T T_UfTeUUV_ZdZ_dW_eVWdeW YRc_Zd WëVd_ZTYZXWbfV_T TR_SVVRdZ_WæVdU

EYV 7DD_TæTf_ZfdVd adVfU dR_U WbfV_T Y aaZXe Rc eVd_ZTYZXWbfV_T_ZYZ_R daVTæf dR_XV
EYV_ZæVZX daR_Z) WëVd_ZTYZXWbfV_T EYV dacRU daVTæf_Z_R RZRSV YZV eV T T WëV
D4E) UV_ZVd_Z_WW d_ZX Re eVZ_Re dR WbfV_T_2_ WëV W_ZX T_UZ_d_VæZVd dacRU
daVTæf_f c_ZX_Z_WW

EYVT T_Z dUfTVU Uf cZX=5 W_TæZ_

EYVT T_Z dUfTVU Re_ZYe RU_Z AD

EYVT T_Z dUfTVU Uf cZX_ZZ f_eZ VW_TæZ_

EYVT T_Z d_TYc_ZWU_ZeYR_V_ê/c_R T T

2_V_ê/c_R S ææRa TRaRTæ cSve W_3 E aZ_R_UDH aZ_a Vd _

D76E d WR_U dZV a Vc D76E d _ 2 S eUZUV d Z_dXReU _eV D4E) UZ/e ZZ ZV
V_d/c_R T a _V_eT f_e

EYVFG= WZY dZV D76E XRe/UcVc YRd ReYdY U W &G H YV_eV eRXVTRc dd S eRa TRaRTe c
Uc ad SV &G 3DE FG= Ttf d eV eRXVReS eRa TRaRTe c d Zdf WZ/ee UcZV YZY dZV D76E
W _EYVT _Vd/cWcTVd f c ZX _ dZV D76E aVcZUZR e dWdYeV eRXV VS eRa TRaRTe c
e XfRdR_dV eVT _Vd/cd W_TeZ _

2eRXZV_T T WbfV_T Ufe TTV d Z ZUS ZZ f WZ V 5f cZXeVT _UZ_ W eRXVU dV TV
W eV Zafee eV fafee RZ_eZ_eV fafee eRXV W V_ZX eVD4E) V_eV Ud _eZ VaRdeeV V U
W eVT T TTV f_eZV dVf ZU aVR ZUf Te cTf cV_e dRTY/ WU EYVT T dR WUe dReR_V TTV TV
aVR ZUf Te cTf cV_e dRTY/ WU c TVRadMUa/c ZVU R Z f _eZ V e5 V Raac : Z ReV fd aRddVd
2dR dV f e e V_dV dV eV fafee eRXVTR SVa/cW eV TYR Xvd Z Zafe eRXV YV_D4E) aVdRdV
Z =5 W_TeZ _eV d ZYX WbfV_T SVXZ de UVTdRdV dYR ZZ f UVTdRdVe)& 9 EYV ZZ f
WbfV_T Z dR d a ddSVRfUZ Z_eV dV TV

5f cZXd a Vc_RUa Vc WRaa ZReZ_d UfVe eV=5 W_TeZ _eV fafee eRXVTR_T dV eRT eV
d aV TYR Xvd W eV Zafe eRXV 2d eV Zafe eRXV d dUf TVUe VRceV fafee eRXV ZV Uf cZXd ZX
a VcfaR_Ua VcU _Raa ZReZ_eV WZ V W eV YZY dZV D76E dRee Raac RTYeV ZZ f RfV
H dY fe=5 W_TeZ _UV SV UeY d a ZeeVd ZYX R SVT VV dReZRU ceV fafee eRXV ZV
fe W Xf ReZ _E R d eY d ac SV eVD4E) =5 UVRfe ReZR dUf TVd eV d ZYX WbfV_T e
ZTdRdVeV W TeZ VUfe T TVR_U RZ_eZ_dXf ReZ _

6 V_ZeV Ufe TTV ReeV dV eV WbfV_T d Z ZUS eV ZZ f _eZ V D4E) TR_deZ RZ_eZ_dRSV
RUfde V_e W eV fafee eRXV Uf cZXeV eR_dZ_ W YZY Zafe eRXVe fafee eRXV

:W eV Zafe fafee eRXV ReZ d e YZY V V_ZeV Tf cV_e TVUd eVT aV_dReZ_daVT ZU aVR eV YZY
dZV D76E TR_edYfeU _bfZ V_fXYe RUfdeeV fafee eRXV EY d Z TRfdV eV fafee eRXVe
T_eZ f fd ZTdRdV f_eZ Vc eRXV ac dTeZ _d cZXV dU E R d eY d dReZ _YV_eVT_UfTeZ_eZ V W
eV YZY dZV D76E e fTYd eV ZZ f _eZ VUfVe eV ZTdRdV Z ZafeR_U fafee eRXVU dV TV
D4E) Z d dY e R V Tf cV_eT _e UV 2W ceV YZY dZV D76E d f cW W eV dZV D76E
Z dV RZ aV_f_eZ eV ZUf Te cTf cV_eUc ad SV eV dVf ZU R V Tf cV_e 5f cZXeV d aVcZU eV V_eT T
TTV ZSVS TUVW dReZ X d eV d ZYX WbfV_T Z UVTdRdV dZTV _eZ V WZY dZV D76E d
W VUReZ d ZZ f RfV eY d eV W TeZ _dV SV d eRe VRUV dV fdZXR4 _dR_e _EZ V 4 E T _e
dT V V

EYV ZUf Te cTf cV_e d _Z dUf cZ X YZY dZV D76E B_RU dZV D76E B _EYV D4E)
Z aV V_d Vc Tf cV_e ac dTeZ _dY TTVS TTV Z_ZX YZY dZV D76E aVR Tf cV_eR_U dZV
D76E R V Tf cV_ee R d ZUf Te cTf cV_e d _ZXR R Uf cZ Xf _V_aVTeU Vc RU c fafee YR dY e
T _UZ _

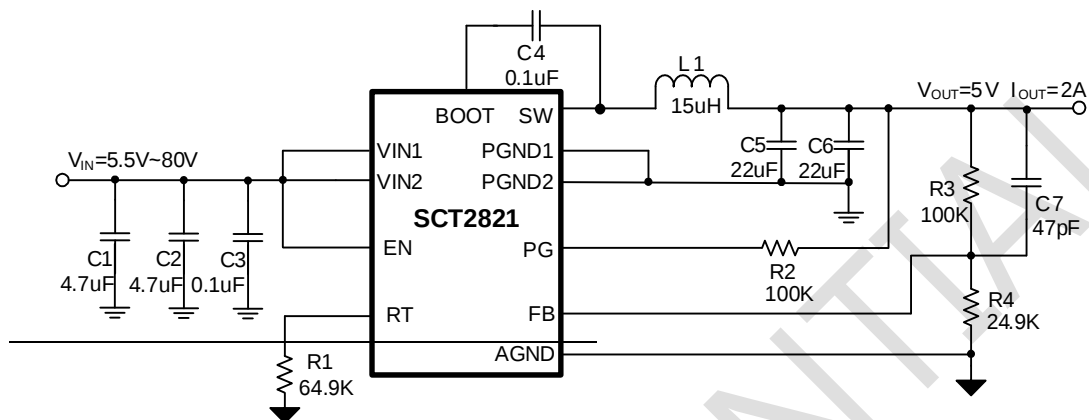
H YV _Vc RU c YR dY e YRaaV d eV ZUf Te cTf cV_e d TR aW Re Vc Tf cV_e Z ReZ_eV T _Vd/c
TR _eac ZV fafee Tf cV_ee dReZ W RUZ X dVf ZV V_e Yf d eV fafee TRaRTe c d UZTYRcXU R_U eV
fafee eRXV Uc ad SV dXf ReU eRXV dY73 eRXV Vdd eR_Ze/c_R dW dV TV eRXVT _eZ f fd EYV
4 A eRXV dR ad fae YZYTR a eRXV H YV_73 eRXV dSV (& W eV dW dV TV eRXVR_U R a/c
& TTV d W dZV Tf cV_e Z d eVT _Vd/cde add ZYX 2W cV RZ_ZX 77Wc) d eVUV ZV dV dReZ
W d W dReaYRdV :W Vc RU c YR dY eT _UZ_deZ V_dUf cZ X d R_U R V4 A eRXVTR aVURe
YZY R a/c d R_U73 eRXV WaSV (& W eV dW dV TV eRXV Wc & TTV d eVUV ZV V_e d f c_ZX
W UVXRZ_H YV _Vc RU c YR dY eT _UZ_ d dV VU eVUV ZV Rfe ReZR dT Vd e V_e d
_c R dXf ReZ_XW_TeZ _

:W eV 73 eRXV Uc ad SV (& W eV dW dV TV eRXV Uf V_e =5 W_TeZ _YZTfa UV ZSVUZRSVU

EYVD4E) Z a V V_æ eV Vc æXV Ac æVæZ_ GA TæTf æ e ZZ ZV fæææ æXV VæY eUf æZ X
RU æR_dZ_e æVT VæZXW fææææ æT_UæZ_c æYe RU æR_dZ_e EYV Vc æXV T aRææ c_ GA
TæTf æT aRææ æV 73 aZ æXV/e æV Zææc R æWæV TV

Ac Uf Te7 UVc=Z d+ D4E)

APPLICATION INFORMATION



:_afeG 8XV	% G c R &&Ge) G
fæfeG 8XV	&G
R Z f fæfe4fαV_e	2
D 8YZX7c/bf V_T	% 9
fæfe 8XV 8a V aVR e aVR	) G

SCT CONFIDE

DZ_TV eV Uf Te c Tf cV_e cZa V Z Tc RdVd ZY eV Zafe eRXV d eV R Z f Zafe eRXV Z Raa ZReZ_ Z
R R d fdVUe TR Tf ReV eV Z Z f Z Uf TeR_TV cVbf ZU FdV 6bf ReZ_) e TR Tf ReV eV Uf TeR_TV R f V

H YVcV+

= : Z eV Z Z f Z Uf TeR_TV cVbf ZU
W Z eV d ZY Z X Wbf V_T
G FE Z eV fafe eRXV
G: R Z eV R Z f Zafe eRXV
: FE R Z eV R Z f 54 RU Tf cV_e
=:C Z T W Z_e W=AA e : FE

EYVe eR Tf cV_eW Z X eYc f XY eV Uf Te c Z eV Uf Te c Z a V Tf cV_ea f d eV fafe Tf cV_e H YV_d V Te Z X
R_ Uf Te c TY dV Z d eU Tf cV_e V da VT Z eV d ReZ Tf cV_e R cV c eYR_ Z aVR aV ReZ Tf cV_e R U
C D Tf cV_e Rd_e SV V TWU U EYV WdV eV aVR d ZY Z X Tf cV_e W Uf Te c :=A62< R_U :=C D TR_SV
TR Tf ReU Rd Z_ 6bf ReZ_* R_U 6bf ReZ_

H YVcV+

:=A62< Z eV Uf Te caVR Tf cV_e
: FE Z eV 54 RU Tf cV_e
:=AA Z eV Uf Te caVR e aVR Tf cV_e
:=C D Z eV Uf Te cC D Tf cV_e

:_ Vc RU Z X c RU eR d Z_e T U Z_d eV Uf Te caVR Tf cV_e TR_Z Tc RdV fae eV d ZY Tf cV_e Z Z W
eV UV ZV ZY Z e a ZR_ 2 EYV deT_d Vc ReZ V Raac RTY Z_e TY dVR_ Uf Te c ZY R d ReZ Tf cV_e
ReZ X Xc ReV c eYR_ 2 3 VTR f dV W eV R Z f :=A62< Z Z U S UV ZV eV R Z f fafe Tf cV_e eY Re eV
D4E) TR_UV Z Vc Rd UVaV Ud_e V Uf Te c Tf cV_e cZa V EYf d eV R Z f U d ZU fafe Tf cV_e Rd
R W Te eV d V V TeZ_ W Uf TeR_TV EYV d R Vc Uf Te c V d f d Z R c Vc Uf Te c Tf cV_e cZa V e R U Z X e R Vc
R Z f fafe Tf cV_e

EYV Zafe Tf cV_e eV d eV a U_ 5454 T_ Vc Vc Z U ZT eZ f f d eV c WdV Z c Vbf Z d R TRaRTZ ce df aa eV
24 Tf cV_e eV d eV a U_ 5454 T_ Vc Vc YZV R Z e Z X eV 54 Zafe eRXV FdV TRaRTZ d ZY 6DC
Wc S V e V c a V d Vc R_TV 4 VdR Z TRaRTZ d ZY I & C cl (C U Z V T e Z d R c V f d f R df XXV d eU SV TR f dV W eV Z
6DC R_U d R eV a V d eV d T W Z_e d R_U Z d eX c V T V_U U e f d V R_e Vc Vc R f V TRaRTZ c V X
f7 ZY d R aRT RXV d ZV e Vc Y Z Y Wbf V_T d ZY Z X_ ZV ARTV eV d R d ZV TRaRTZ c Rd
T dVe G: R_U 8 5 a Z d Rd a dd Z V

EYV eRXV ReZ X W eV Zafe TRaRTZ c f deSV Xc ReV c eYR_eV R Z f Zafe eRXV 2_Ue

7 cdZ a ~~ReZ~~_ TY dVR_ ZafeTRaRT~~z~~ c ~~BY~~R_ C D Tf ~~αV_eReZ~~X Xc/Rc eYR_ YRW W~~eV~~ R Z f RU
Tf ~~αV_e~~

H YV_ dVVT~~z~~X TVdR Z TRaRT~~z~~ ~~α~~ ~~z~~_ WUd e T _dZVceYV W~~W~~TeZV RfV WR TRaRT~~z~~ c UVTc/RdZ_X Rd eY 5 4
S~~Z~~d ~~RXV~~RtC dd R TRaRT~~z~~ cZTc/RdZ_X

EYV_ZafeTRaRT~~z~~R_TV RfVUV~~c~~ ZVd eYV_Zafe~~z~~a V ~~RXV~~ W~~eV~~ dXf Re c EYV_Zafe ~~RXV~~ ~~z~~a V TR_ SV
TRTf ReUfdZ_X6bfReZ_ R_UeYV R Z f _Zafe ~~RXV~~ ~~z~~a V Ttf ~~α~~ Re& Ufe T TV

7 ceY~~Z~~ V~~R~~ aV e %(7 I (C TVdR Z TRaRT~~z~~ ~~α~~ d~~ReU~~ Wc G_Z_aRdR V Rd/ f dWU 2_UR 7 Wc Y~~Z~~X
W~~bf~~ V_T W~~c~~/Z_X TRaRT~~z~~ cZa RTVURd T dVRda ddS~~V~~e eYVUV ZVaZ_d

2 7 TVdR Z TRaRT~~z~~ c fdeSV T __VT~~eU~~ S~~V~~e W_3 E aZ_R_UDH aZ_ Wc ac aVc aV~~ReZ~~_ 2 TVdR Z
TRaRT~~z~~ c ~~BY~~I &C cS~~V~~cXcRUVUZ/VTeZ Z dVT V_UVU EYV TRaRT~~z~~ cdY f UYR VR G cY~~Z~~XVc ~~RXV~~
d~~ReZ~~X

EYVdVVT~~z~~_ Wf~~e~~feTRaRT~~z~~ c Z R~~W~~Te f~~e~~fe ~~RXV~~ ~~z~~a VZ_d~~e~~/RU d~~Re~~/R_U RU~~α~~R_dZ/_eaVdWc R_TV

EYV f~~e~~fec~~z~~a V Z VddV ~~α~~ T a dWU W~~e~~ aR~~α~~ _V Z TRfdWUS eYV_ZUf Te cTf ~~αV_e~~~~z~~a V X_ZXeYc f XY
eYV6bfZR_V_eDV~~c~~Zd CVd~~z~~~~Re~~_TV6DC W~~eV~~ f~~e~~feTRaRT~~z~~ ~~α~~ R_UeYV eYV~~c~~ Z TRfdWUS eYV_ZUf Te cTf ~~αV_e~~~~z~~a V
TYR~~c~~Z_XR_UUZTYR~~c~~Z_XeYV f~~e~~feTRaRT~~z~~ ~~α~~ E RTY~~Z~~/ Vd R f~~e~~fe ~~RXV~~ ~~z~~a V TY dVR 6DC f~~e~~fe
TRaRT~~z~~ c ZV TVdR Z TRaRT~~z~~ c 7 c TVdR Z TRaRT~~z~~ ~~α~~ eYV TRaRT~~z~~_TV U _Z~~Re~~d eYV f~~e~~fe ~~z~~a V 7 c
dZ a ~~ReZ~~_ eYV f~~e~~fe ~~RXV~~ ~~z~~a V TR_ SV Vd~~z~~ ReUS 6bfReZ_ %UVdZU

%

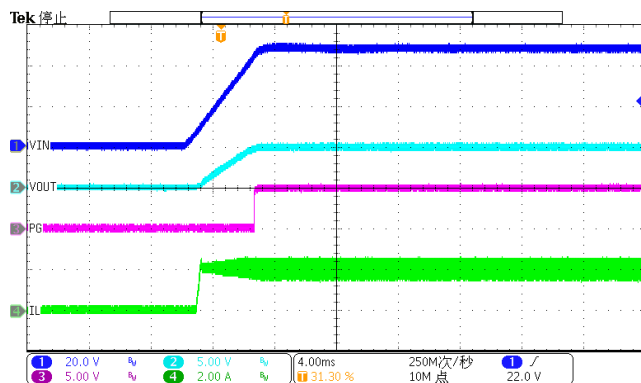
H YV~~c~~+

~~z~~ eYV f~~e~~fe ~~RXV~~ ~~z~~a V
W~~H~~ ~~z~~ eYVd ~~BYZ~~X W~~bf~~ V_T
= ~~z~~ eYV_ZUf TeR_TV W~~Z~~Uf Te c
4 ~~FE~~ ~~z~~ eYV f~~e~~feTRaRT~~z~~_TV
G ~~FE~~ ~~z~~ eYV f~~e~~fe ~~RXV~~
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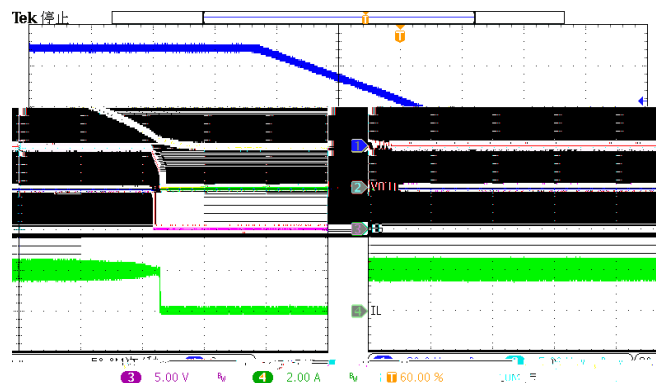
5 f V e TRaRTZ cd UVXcRUZ_X f _Uvc 54 SRd eV SRd eRXV TR_dZ_ZIR_e dUf TV TRaRTZ_TV 4 VdR Z
 TRaRTZ cd TR_dV de WYVZ TRaRTZ_TV Re dRU eRXV EYVcWVc VR V RcZ_eV eRXV dRZ_Xe
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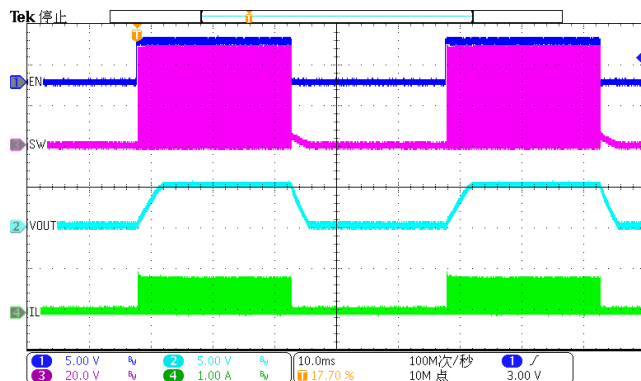
G. . % G G FE. & G 7_{DH}. % f_Vdd eVc dV_ eU



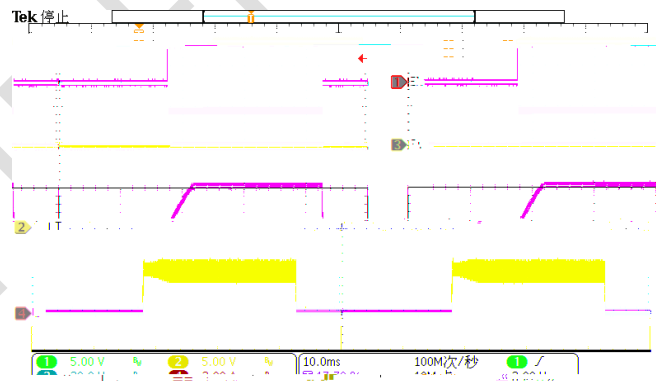
7Zf dV A Vcfa := 25. 2



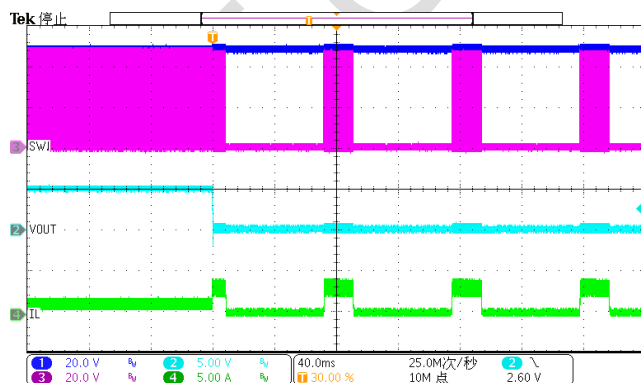
7Zf dV A VcU _ := 25. 2



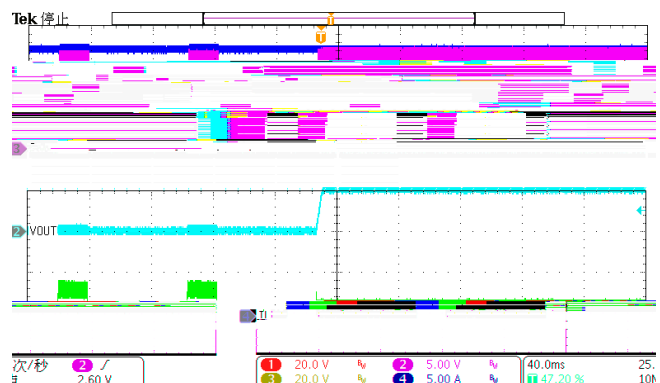
7Zf dV % 6 e XXV := 25. 2



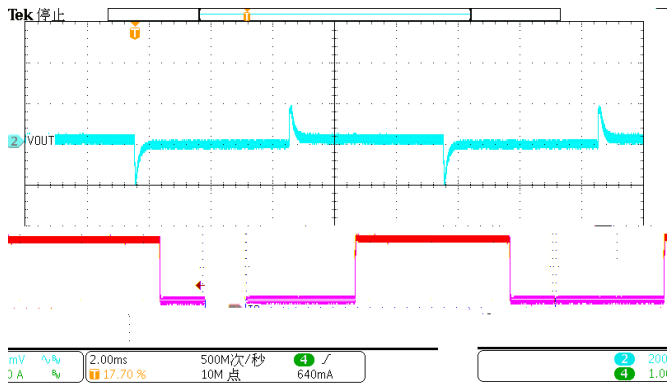
7Zf dV & 6 e XXV := 25. 2



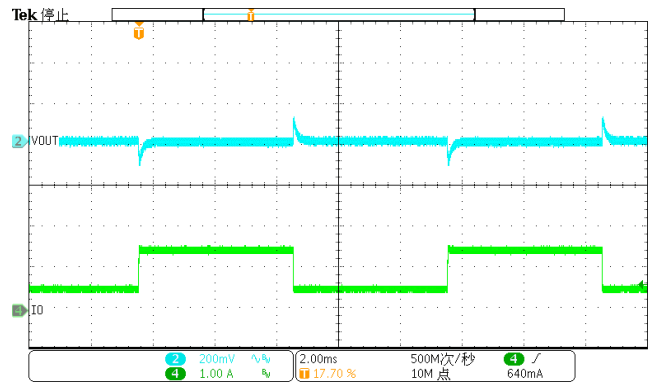
7Zf dV Vc4 f dV_eAc e/TeZ_ 2 e YRdJ dY æ



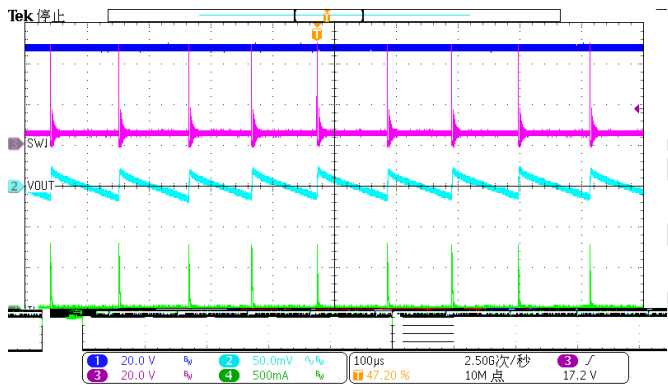
7Zf dV (Vc4 f dV_eCVVRdV YRdJ dY æ 2



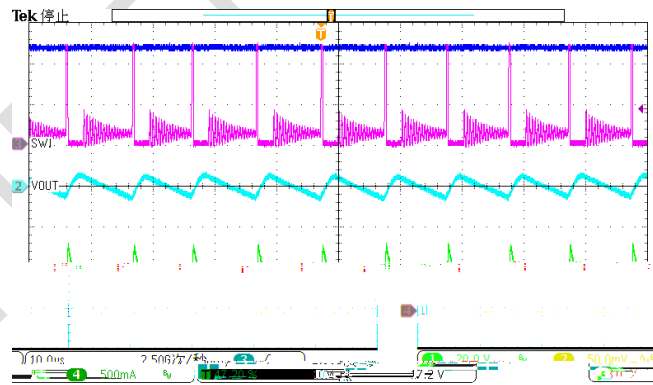
$$7Zf dV) = RUEdR_dZ/e \quad 2 \quad)2 \quad 2 \quad fd$$



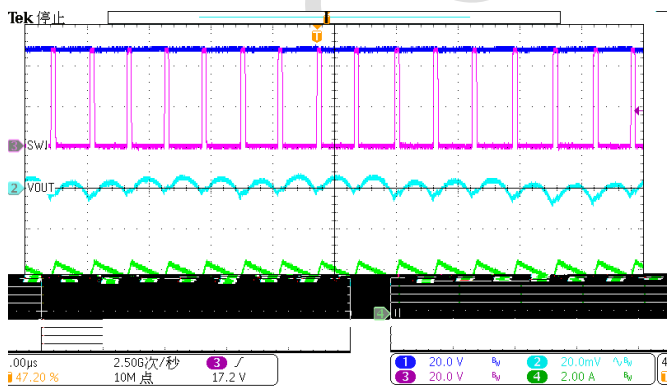
$$7Zf dV * = RUEdR_dZ/e \quad \&2 \quad \&2 \quad 2 \quad fd$$



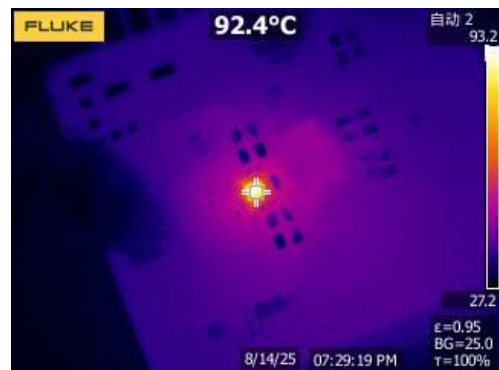
$$7Zf dV \quad f\ae f eCZa V := 25. \quad 2$$



$$7Zf dV \quad f\ae f eCZa V := 25. \quad 2$$



$$7Zf dV \quad f\ae f eCZa V := 25. \quad 2$$



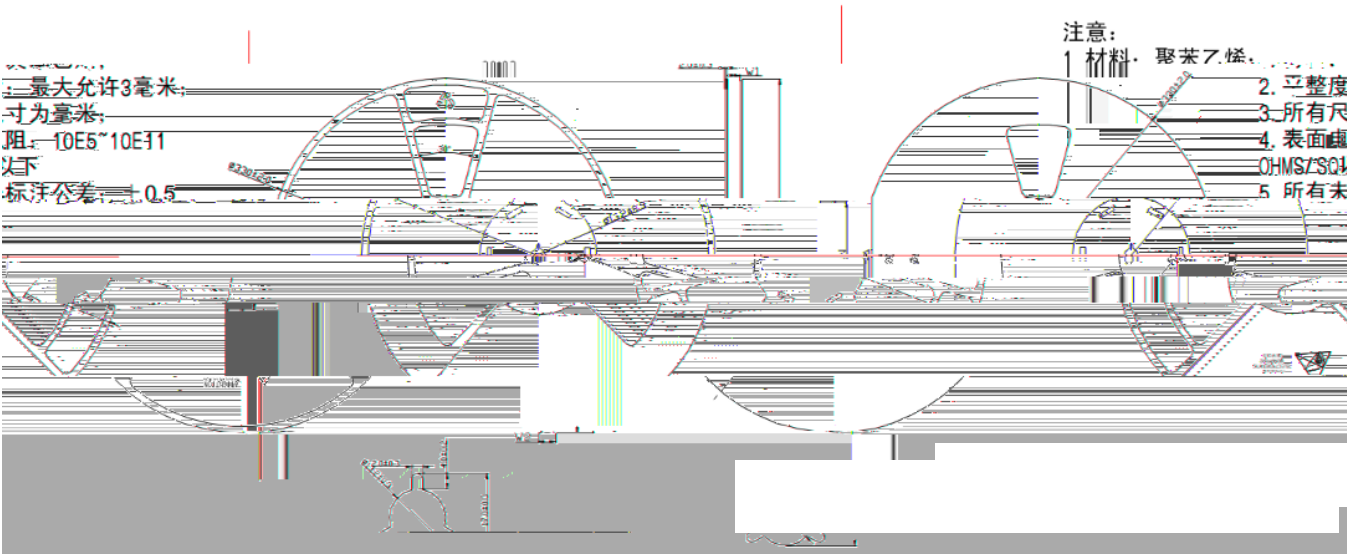
$$7Zf dV \quad EYc R \quad \% G. \quad \&G \quad FE \quad \&2$$

Ac aVcA43 R feZ R ToZ R WcD4E)

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TAPE AND REEL INFORMATION



PRODUCT SPECIFICATIONS				
TYPE	WIDTH	ØA	ØN	W1(Min) W2(Max)
12MM		330±2.0	100±1.0	12.4 19.4
16mm		330±2.0	100±1.0	16.4 23.4
24MM		330±2.0	100±1.0	24.4 31.4
32MM		330±2.0	100±1.0	32.4 39.4
40MM		330±2.0	100±1.0	40.4 47.4

