

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

FEATURES

H ZV: afeG dRXV CR_XV+%%G) G
 4_eZf fd fafe4fcdV_e+ 2
 G 7WUSRT CWdV_TV G dRXV/Re & 4
 :_dXcRdU D76Ed (CUD _
 = dYf dJ _TfcdV_e+ f2
 = Bf ZdT_e4fcdV_e+ f2
 Af dVD ZaaZX 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_
 AdVTZ_6_RSVEYcdY UWcRUfdRSV:_afe
 G dRXVF UVcG dRXV= T feAc dTeZ_
 FG= EYcdY UR_U9 dVcdVd
 Dfaa cedRefa ZYacV SRdUJ fafe
 Vc dRXVR_U VcEV aVdReV Ac dTeZ_
 74EB7 & = ART RXV

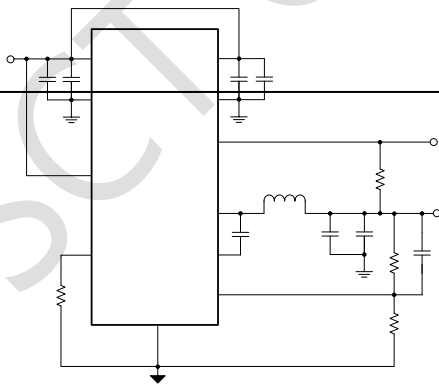
APPLICATIONS

:_Uf deZR 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 d SfT T_VcdVd ZY
 ZV_Zafe dRXV dR_XZXW %%G e) G YZY
 Z_eXcRdR (YZY dZV D76E R UR
 dZV D76E EYVD4E) RU aeZX eYV aVR
 TfcdV_e UV T_ec dfaa cd eYV Af dV D ZaaZX
 Uf ReZ_ AD ZY e aZR f2 bf ZdT_e
 TfcdV_e YZY RddZed eYV T_VcdVc_RTYZ/ ZX YZY
 VWZ_T Re ZYe RU cdeR_US T_UZ_
 EYVD4E) WReV dR_ZeVcR & dd WdReEZ V
 e R ZU RcdV_ZcdY TfcdV_e RU fafe dRXV
 VcdY eUf cZX dRefa EYVd ZYZXWbfV_T TR_
 SV RUfdUW 9 e & 9 EYVD4E)
 Z_eXcRd=5 W_TeZ_R_U ZZ f _eZ VW_TeZ_
 d ZTR dfaa ce_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_EYVD4E) WReV dVd
 7dbfV_T DacRU DaVTef 7DD fdVd R
 adVfU dR_U WbfV_T YaaZX ZY) ZVcZX
 daR_WeV d ZYZX WbfV_T e dUfTV eYV
 T_Uf TeU 6 :
 EYVD4E) 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 SVad Wcad/ Zfd d/ Z_Z_d R UZWCW aRXV_f SVad Z_eV Tf ad_e VdZ_ CV Z_Z_)+4fde VcDR aVd

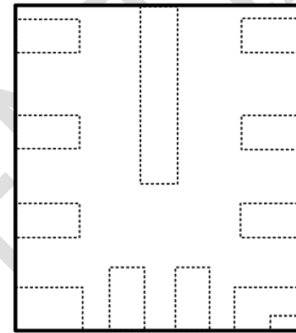
DEVICE ORDER INFORMATION

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

Vc aVReZXWVRZe/ aVRe d/f Vdd eVc ZV eU			
G: 6		) &	G
3 E		*	G
DH		) &	G
DH - _d		) &	G
3 E DH			G
73 CE			G
A8			G
aVReZX f_TeZ_e/ aVRe d/E %	%	&	4
De dRXVd/ aVRe d/EDE8	&	&	4

PIN CONFIGURATION



- (1) DecVdVd SV_UeY dV ZdeUf UVc2Sd fde/ R Z f CRZX R TrfdVUV ZVaVc R_VeUR RXV EYVUV ZVZ_eXfRd_eWUe W_TeZ_fedZV Wd CVT V_UU aVReZ_4_UZ_d
- (2) EYV R G: eR dZ_e dRXV dXfRd_eWUS UvdZ_RU VcZU SV TY
- (3) EYV Raa Zde eV cZXZ dRXV XV_VReUS ZVW_eV_eVc_R Raa ZU dRXV
- (4) EYV:4 ZTfUvd VceV aVRe d/ac dTeZ_e ac dTeVUV ZVUf cZX Vc RU T_UZ_d f_TeZ_eV aVRe d/ Z V TWU & 4 YV_VceV aVRe d/ac dTeZ_d RTeZV 4_eZf fd W_TeZ_RS VeVdaVTZU R Z f aVReX f_TeZ_e/ aVRe d/ Z dUf TV ZVZ V

PIN FUNCTIONS

A8 5		:_dVc R a VcXc f_U 4 __VTe d de/ Xc f_U = Z aUR_TV T __VTeZ_ f deSV ac ZMUe A8 5 4 __VTeR YZYbfR S aRdd TRaRT c c TRaRT cd W eY d aZ_e G:
G:		:_afedfaa e eYV T _Vdc 4 __VTeR YZYbfR S aRdd TRaRT c c TRaRT cd W eY d aZ_e A8 5 = Z aUR_TV T __VTeZ_ f deSV ac ZMUe G:
3DE		A Vcdf aa SZd Wc YZY dZV a Vc D76E XReVUcZVc 4 __VTeR f 7 TRaRT c W 3 E aZ_e DH aZ_3 eRa TRaRT c d TYRcXU YV_DH dRXV d
A8	%	aV_UdZ_a VcX U VRX fafe 4 __VTe R df dRSV dRXV dfaa eYc fXY R Tf ad_e Z ZZX dVdZ c 9ZY. a Vc < . a VcSRU EYVVRXaf d YV_6 .eTR SV Wd aV YV_efdWU
73	&	:_VcZXZafe WdV dR_d T_Uf Td TV Vcc cR a ZVc EYV dRa Wd_eVc_R WUSRT dVdZ cUZ ZVcW eYV fafee 8 5 dVd eYV fafe dRXV EYVUV ZV dXf Rd d 73 dRXVe eV Z dVc R dWd/ TV RfV WGe aZR
28 5		2_R XXc f_U DZXV a ZeT __VTeZ_e A8 5 cd de/ Xc f_U

CE	(	DVeeVZe/cR dTZRe cT T WbfV_T cd_TYc_ZVe R_Ve/cR T T 4 __VTe R dVdZe cW eYd aZe Xc f_Ue dVed ZYXWbfV_T 2_Ve/cR T T TR_SV ZafeUZTe e eV CE aZ_EYV Ze/cR dTZRe cd_TYc_ZVde eV V_e/cR T T WbfV_T ZY A== :WVVeTeUT T ZXVUXVd de a eV aVReZ_ UVRfe ReZR dVf c de dVdZe cac XdR VUWbfV_T
6	)	6_RSVZafee dXf Re c 9ZY. . 77 4R_SVT __VTeUUZTe 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 aUR TVT VTeZ fdeSVac ZMUe G:
A8 5		:_e/cR a VcXc f_U 4 __VTe d de/ Xc f_U = Z aUR 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/cR 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

G _{6D5}	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 C₂ RUC₄ f SVd _ Rd dWdV_TVe VdZ Re/ f _TeZ_ e/ aVRe dV VdVUV ZVd C₂ RUC₄ RdV_eR
TYRdTe/cZReZ VdRT RXV ZVWSfe W R_ eVcd de/ V V TYRdTe/cZReZ df TYRd eVUVdZ_R U R fe VdV acZ eU TZf Z
S RdJ A43 _ YZYeVD4E) Z f_eU eVc R aRU dZV R UV_e/cR 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 ReZ_ VdV A43 S RdJ TYR_XVd eV VdV_Z_T VdV
YVRedZ_R UeVdWdVeVVRfR C₂ RUC₄
VRdf dU _6D5& (%R VcA43 EYV RfVd XZV_Z eYd eSVRd/ _ RZJWcT aRcZ_ ZY eVcaRT RXVd R_U TR_ e
SVfdVUWcUdZ_ 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 RTfR 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

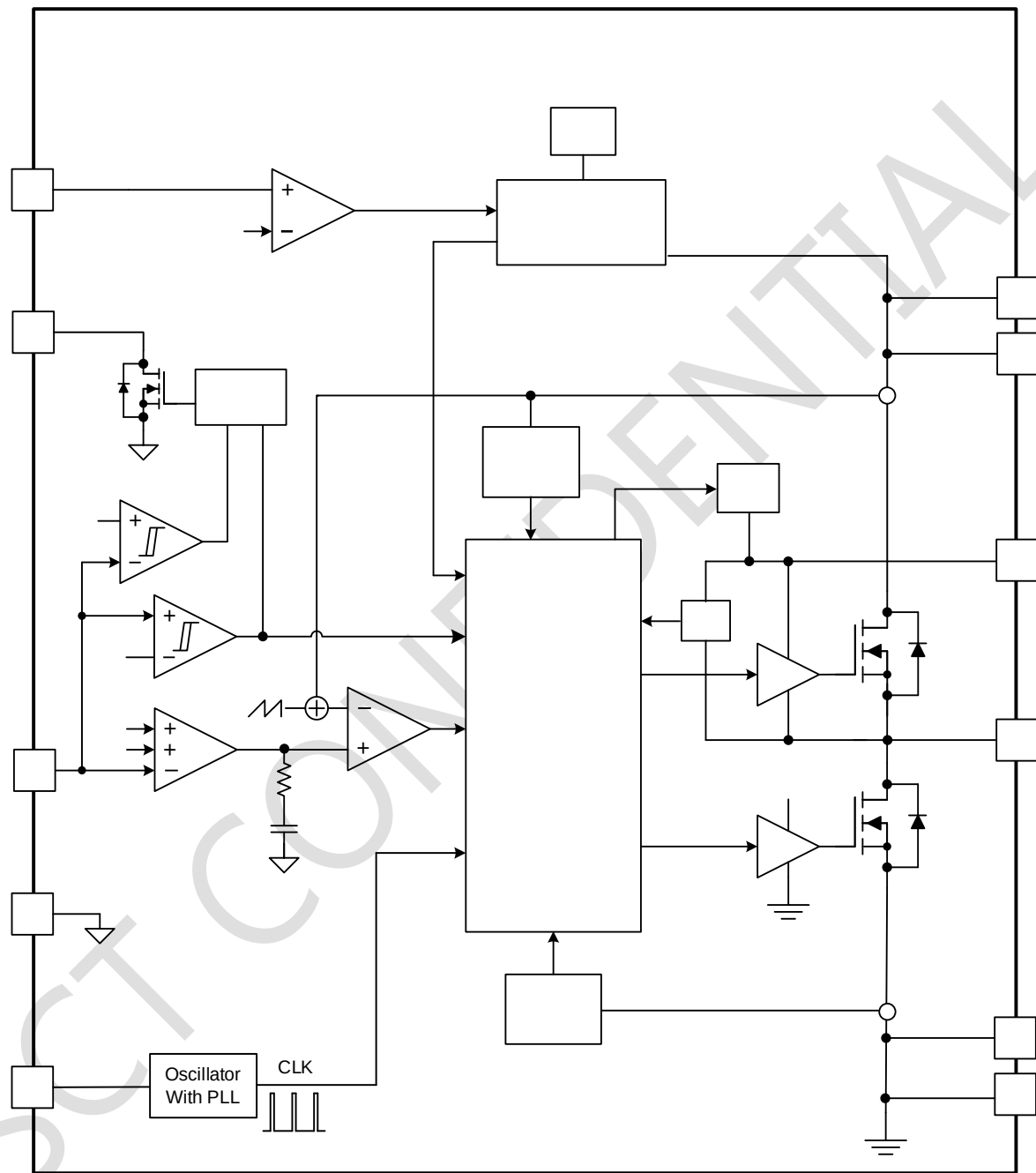
G: . %G E . % 4 & 4 eaZRR RfVZle/dUf_UVc & 4

G:	aVRe_Z_Zafe eRXV		%%)	G
G: PFG=	:_afeFG= EYdY U 9 deV/dZ	G: cZ_X	&& %%	G G
:D95	DYf dJ _Tf αV_eW G: aZ	6 . G		2
:B	B f Z dTV_eTf αV_eW G: aZ	6 . G _ _ d ZYX 3 E DH . &G		2
:2TeZVP6G	2 TeZV Tf αV_eW G: aZ	G: . %G 6 . &G G FE. &G RU	%&	f2
C5D P9	9ZY dZV D76E _ dVdZ TV	G3 E GDH . % G	(	
C5D P=	= dZV D76E _ dVdZ TV			

Gc67

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FUNCTIONAL BLOCK DIAGRAM

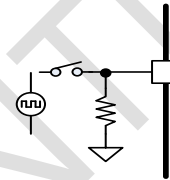


7Zf dV) 7f_TeZ_R 3 T 5BXdR

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_è/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_eRXVZe aZR G CE DJ 4 aZ_Z_e
R WUe SV WWRæZX cdY æUe eV Xc f_U FdV 6bfReZ_% cèV a eZ 7Zf dV e UVæc_ZV eV
dVdZeR_TVWcRd_ZTYZXWbfV_T_VUWU



YVd 7d Zd_ZTYXT 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_è/c_R T T Raa_ZUe CE DJ 4 aZ
EYVd_TYc_ZReZ_WbfV_T dR_XVZW 9 e & 9 R_UeVcæZXUXV WëV DH d_TYc_ZVde eV
W_ZX UXV WëV V_è/c_R T T Re CE DJ 4 aZ_Ze aZR_d eZ V UVR 2 dbfRdV R VT 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 dURd dY_Z 7Zf dV 3WdVR_V_è/c_R T T Z adV_e eVUV_ZV cd_Z dVdZe cdVæZX
WbfV_T UV H YV_R_V_è/c_R T T Z adV_eU eVUV_ZVRfe ReZR æR dZ_d W dVdZe cdVæZX
UVe V_è/c_R T T d_TYc_ZReZ_ UV 2_Zè/c_R aYRdV T WU a A== T d_Zè/c_R T T WbfV_T
_e eV V_è/c_R T T_ZYZ_e aZR & fd EYVT_VæVcæR dZ_d W eVT T d_TYc_ZReZ_ UVe eV
dVdZe cdVæZXWbfV_T UV_YV_eV V_è/c_R T T UZRaaVRd

E dUfTV6 : eVD4E) Z aV V æ 7dVfV_T DacVRU DaVTæf 7DD EYVaf ca dV WdæVRU daVTæf Z
e VZ_ZReV aVR V ZdZ_d Re daVTæf WbfV_TZd S dacVRUZX eVdV V ZdZ_d RTc dd R_ZVc dR_XV W
WbfV_TZd dReVc eYR_Rææ_ZY VZU WbfV_T W_TæZ_ : de d dèV d T æZZX eV D4E)
WbfV_T T_UfTeUUV ZdZ_d W eV VædeW YRc_Zd WëVd_ZTYZXWbfV_T TR_SVVRdZ WæVdU

EYV 7DD TæTf æfdVd adVfU dR_U WbfV_T Y aaZXe Rc eVd_ZTYZXWbfV_T_ZYZ_R daVTæf dR_XV
EYV_ZæVZX daR_Z) WëVd_ZTYZXWbfV_T EYV dacVRU daVTæf Z_R RZRSV YZV eVT T WëV
D4E) UV_ZVd_Z WVV d_ZX Re eVZæ_RæR WbfV_T 2_ WëV W_ZXT_UZ_d VæZVd dacVRU
daVTæf æc_ZXæ W

EYVT T Zd dUfTVU Uf cZX=5 W_TæZ_

EYVT T Zd dUfTVURe_ZYe RUZ_AD

EYVT T Zd dUfTVU Uf cZX_ZZ f_eZ VW_TæZ_

EYVT T Zd d_TYc_ZWU_ZeYR_V_è/c_R T T

2_V_è/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 T TV d Z ZUS ZZ f WZ V 5f cX eVT _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 T TVf _eZV dVf ZU aVR ZUf Te cTf cV_e dRTY/ WU EYVT T dR WUe dReR_V T TV 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 dVf ee V_dV dV eV fafee eRXVTR SVa/cW eV TYR Xvd Z Zafe eRXV YV_D4E) aVdRd
Z =5 W_TeZ _eVd ZY ZX WbfV_T SVXZ de UVTdRdV ZYR ZZ f UVTdRdVe)& 9 EYV ZZ f
WbfV_T Z ZR Z 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 ZY fe=5 W_TeZ _UV SV UeY d a ZeeVd ZY ZX R SVT VV dReZRU ceV fafee eRXV ZV
fe W Xf ReZ _E R Z eY d ac SV eVD4E) =5 UVRfe ReZR dUf TVd eVd ZY ZX WbfV_T e
ZTdRdVeV W TeZ VUfe T TVR_U RZ_eZ_dXf ReZ _

6 V_ZeV Ufe T TV 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 cX eV 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 ZTdRdVf_eZ Vc eRXV ac dTeZ _d cXV dU E R Z eY d dReZ _YV_eVT_UfTeZ_eZ V W
eV YZY dZV D76E e f TYd eV ZZ f _eZ VUfVe eV ZTdRdV Z ZafeR_U fafee eRXVU dV TV
D4E) Z d ZY 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 cX eY d aVcZU eV V_eT T
T TV Z SVS T WUW dReZ X d eVd ZY ZX 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 ZVfdZXR4 _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 _Z Y T TVS T TV Z Z_X YZY dZV D76E aVR Tf cV_eR_U dZV
D76E R V Tf cV_ee R Z Uf Te cTf cV_e d _ZXR R Uf cZ Xf _V_aVTeU Vc RU c fafee YRdY d e
T _UZ_

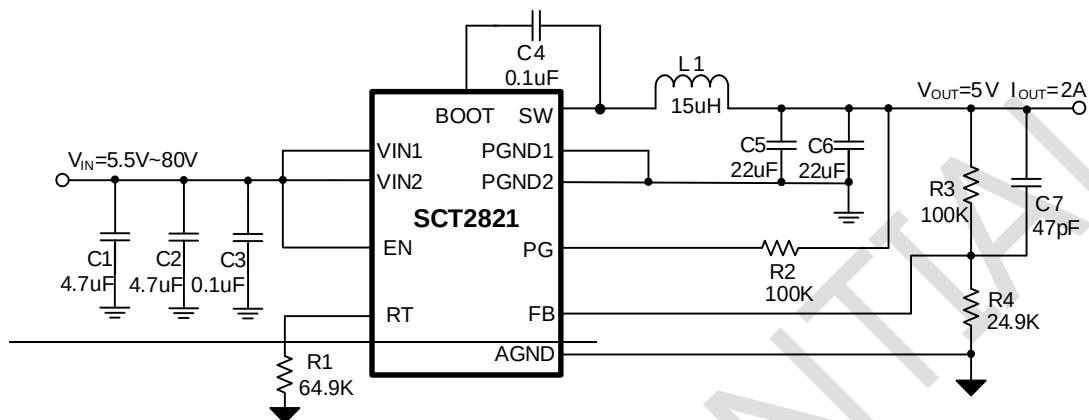
H YV _Vc RU c YRdY d eY RaaV d eV ZUf Te cTf cV_e d TR aW Re Vc Tf cV_e Z ReZ_eV T _Vd/c
TR _eac ZV fafee Tf cV_ee dReZ W RUZ X dVf ZV V_e Yf d eV fafee TRaRTe c d UZ TYRcXU R_U eV
fafee eRXV Uc ad SV dXf ReU eRXV ZY73 eRXV Vdd eYR_Ze/c_R dW dV TV eRXVT _eZ f fd EYV
4 A eRXV dR ad fae YZY TR a eRXV H YV_73 eRXV d SV (& W eV dW dV TV eRXVR_U R/c
& T TVd W dZV Tf cV_e Z Z eVT _Vd/cde add ZY ZX 2W cV RZ_ZX 77 Wc) d eVUV ZV dV dReZ
W d W dReaYRdV :W Vc RU c YRdY d eT _UZ_deZ V_d Uf cZ X d R_U R V 4 A eRXVTR aVURe
YZY R/c d R_U 73 eRXV Wa SV (& W eV dW dV TV eRXV Wc & T TVd eVUV ZV V_e d f c_ZX
W UVRXRZ_H YV _Vc RU c YRdY d 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 Z SVUZRSVU

EYVD4E) Z aV V_d eV Vc eRXV Ac eVTeZ_ GA TzTf Zc e ZZ ZV fæfe eRXV VdY eUf cZ_X
RU eR_dZ_e dVT VcZXW fæfeWf eT_UZ_c ZYe RU eR_dZ_e EYV Vc eRXV T aRRe cZ_ GA
TzTf ZT aRdVd eV 73 aZ eRXV e eV Z dVc R dWdV TV



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 cZa V Tf cV_ea f d eV fafe Tf cV_e H YV_d V TeZ X
R_ Uf Te c TY dV Z d eU Tf cV_e Vda 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 dZ_eT 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 aZR_ 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 ZU S UV ZV eV R Z f fafe Tf cV_e eY ReV
D4E) TR_UV Z Vc Rd UVaV Ud_eV Uf Te c Tf cV_e cZa V EY f d eV R Z f U d ZU fafe Tf cV_e Rd
R W Te eV d 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_ V c 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_ V c Vc YZV R Z eZ X eV 54 Zafe eRXV FdV TRaRTZ d ZY 6DC
Wc S V c a V d Vc R_TV 4 VdR Z TRaRTZ d ZY I & C cl (C U Z V Te 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_eV c Vc R f V TRaRTZ c V X
f7 ZY d R aRT RXV d ZV e V c 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 aZ d Rd a dd Z V

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

7 cdZ a ~~ReZ~~_ TY dVR_ ZafeTRaRT~~Z~~ c ~~ZY~~R_ C D Tf ~~αV_e~~ ~~ReZ~~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~~T~~Z~~V RfV WR TRaRT~~Z~~ c UVTc/RdZ_X Rd eY 5 4
S~~Z~~d ~~RXV~~RtC dd R TRaRT~~Z~~ c ~~Z~~Tc/RdZ_X

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

7 ceY~~Z~~ V~~R~~ aV e %(7 l (C TVdR Z TRaRT~~Z~~ ~~α~~ ~~ReU~~ Wc G_Z_aRdR V Rd/ fdWU 2_UR 7 Wc Y~~Z~~X
W~~W~~bfV_T W~~W~~cZ_X TRaRT~~Z~~ c ~~Z~~ a RTVURd T dVRd a ddS V e eYVUV ZV aZ_d

2 7 TVdR Z TRaRT~~Z~~ c fdeSV T __VT~~eU~~ S~~V~~e W_3 E aZ_R_ U DH aZ_ Wc ac aVc aV~~ReZ~~_ 2 TVdR Z
TRaRT~~Z~~ c ~~ZY~~ l &C cS~~V~~cXcRUVU~~Z~~/V~~teZ~~ ~~Z~~ dVT V_UVU EYV TRaRT~~Z~~ cdY f U YR VR G cY~~Z~~XVc ~~RXV~~
~~ReZ~~_X

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

EYV f~~e~~fec~~aa~~ V ~~Z~~ VddV ~~α~~ T a dWU W~~e~~ aR~~α~~ _V ~~Z~~ TRfdWU S eYV_ZUf Te cTf ~~αV_e~~ ~~c~~aa V X_ZXeYc f XY
eYV6bfZR_V_eDV~~c~~Z_d CVd~~Z~~ ~~Z~~_TV6DC W~~eV~~ f~~e~~feTRaRT~~Z~~ ~~α~~ R_UeYV eYV~~c~~ ~~Z~~ TRfdWU S eYV_ZUf Te cTf ~~αV_e~~ ~~c~~aa V
TYR~~c~~Z_XR_UU~~Z~~TYR~~c~~Z_XeYV f~~e~~feTRaRT~~Z~~ ~~α~~ E RTY~~Z~~/ Vd R f~~e~~fe ~~RXV~~ ~~c~~aa 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 ~~c~~aa V 7 c
dZ a ~~ReZ~~_ eYV f~~e~~fe ~~RXV~~ ~~c~~aa V TR_ SV Vd~~Z~~ ReU S 6bfReZ_ %UVdZU

%

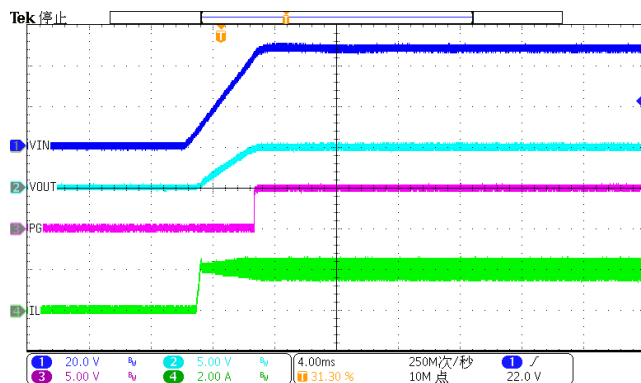
H YV~~α~~+

~~Z~~ eYV f~~e~~fe ~~RXV~~ ~~c~~aa V
W~~H~~ ~~Z~~ eYVd ~~ZY~~Z_X W~~W~~bfV_T
= ~~Z~~ eYV_ZUf TeR_TV W~~W~~Uf Te c
4 ~~FE~~ ~~Z~~ eYV f~~e~~feTRaRT~~Z~~_TV
G ~~FE~~ ~~Z~~ eYV f~~e~~fe ~~RXV~~
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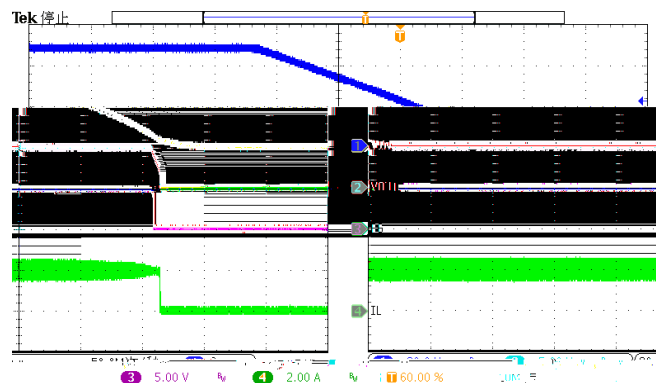
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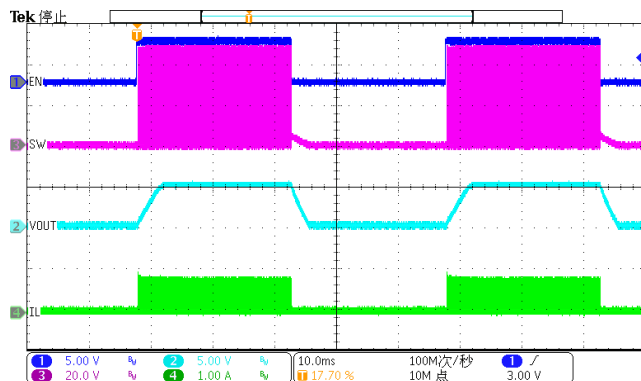
G. . % G G FE. & G 7_{DH}. % f_Vdd eVc dV_eU



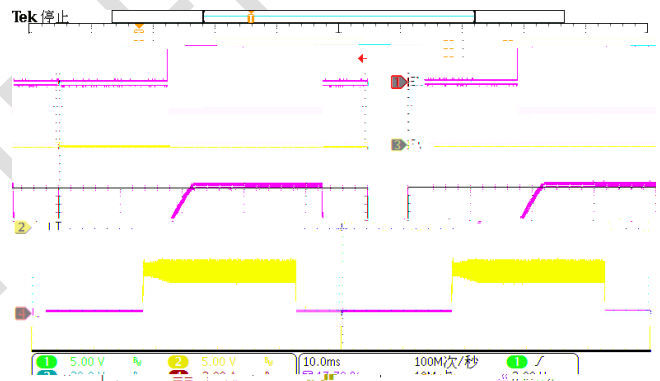
7Zf dV A Vcfa := 25. 2



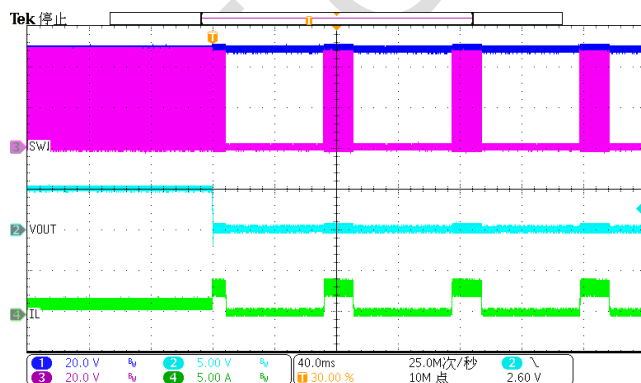
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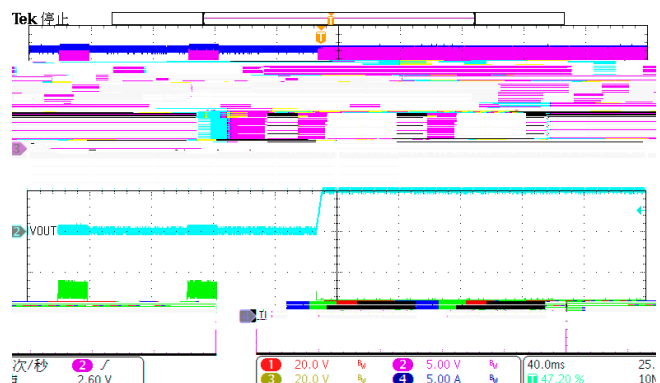
7Zf dV % 6 e XXV := 25. 2



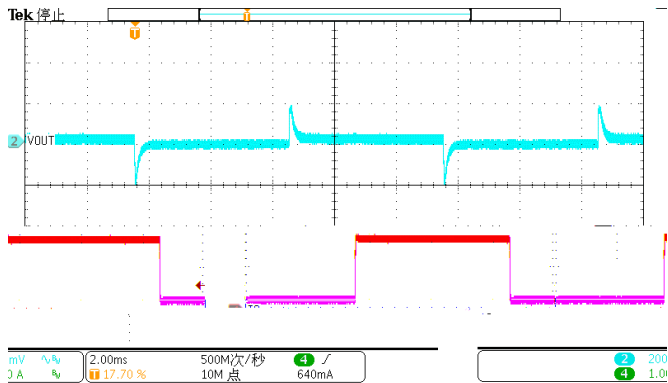
7Zf dV & 6 e XXV := 25. 2



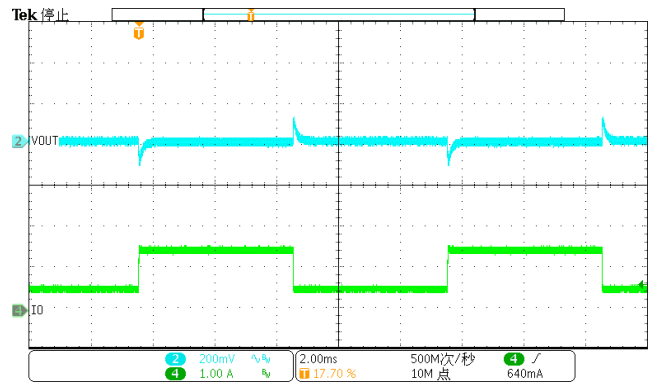
7Zf dV Vc4 f dV_eAc eVTeZ_ 2 e YRdJ dY æ



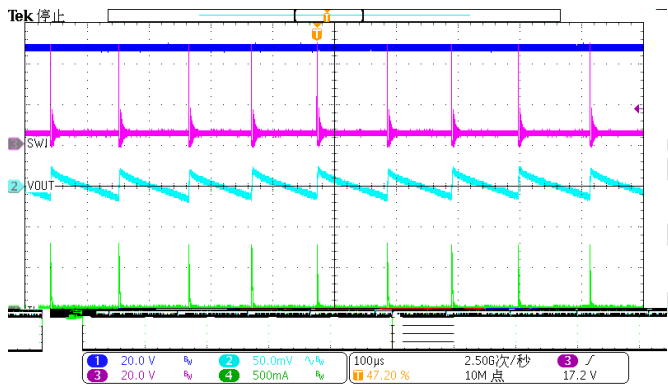
7Zf dV (Vc4 f dV_eCVVRdV YRdJ dY æ 2



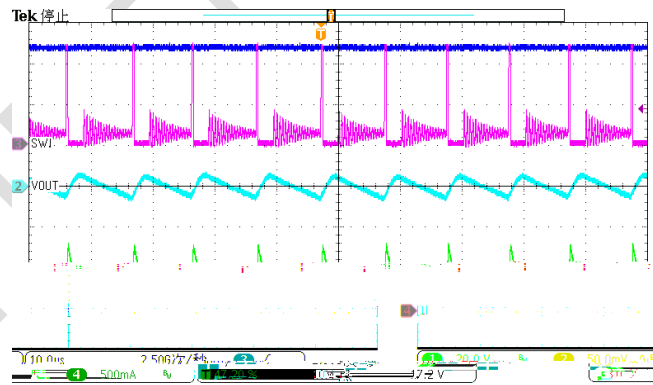
$$7Zf dV) = RUEdR_dZ/e \quad 2 \quad)2 \quad 2 \quad fd$$



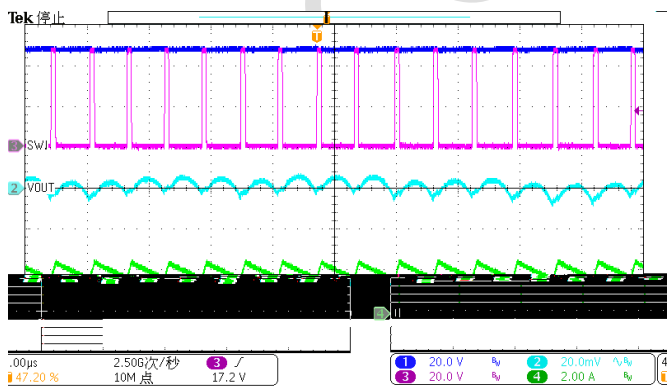
$$7Zf dV * = RUEdR_dZ/e \quad \&2 \quad \&2 \quad 2 \quad fd$$



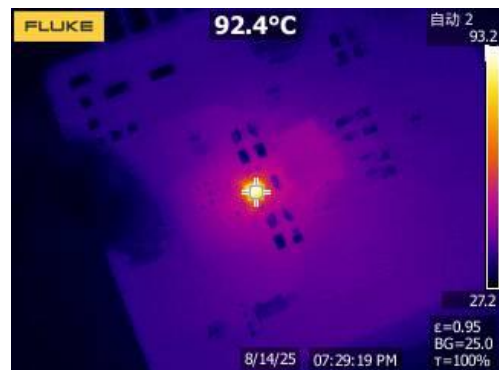
$$7Zf dV \quad f\ae f eCZa V := 25. \quad 2$$



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



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



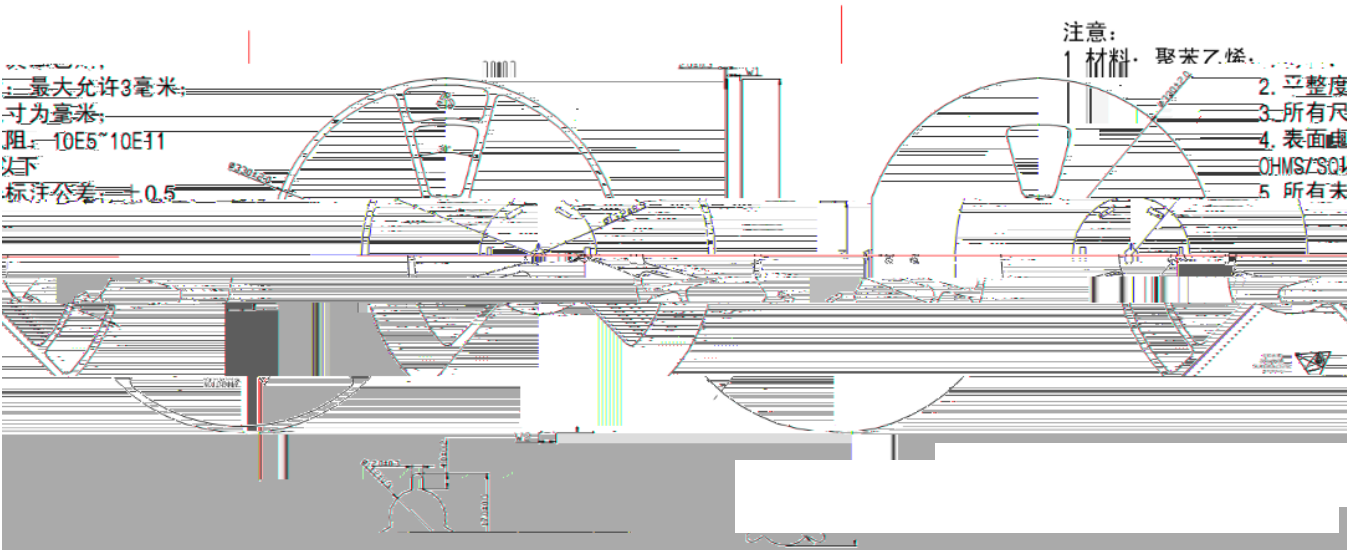
$$7Zf dV \quad EYc R \quad \% G. \quad \&G \quad FE \quad \&2$$

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

