

17S P A A ?

CB ROBP ?

NJ .SUZY TFLJ
& (TSYSZTX4 ZUZY(ZWWSY NM.SYLVWJ
R R +*9X
NJ 4 ZUZY TFLJ 7FSLJ
6 ZNXHJSY(ZWWSY Z&
(HQ G (HQ(ZWWSY1RNSL
.SYVQ RX8TKY8FW1RNXWJ NSVXM
HZWWSY
+NJI P- _8 NMSL +WVZJSH
.SUZY: SI JW TFLJ 1THPTZY
5T JWF J RTI J FYQIMQFI
4 JWJRWWZW 5WYHNTS
& FNGQ SF 849 FSI 9849 5FHFFLJ

MM F ELKP?

+GY5FSJQ NNFQ FSI 2 TSNTW
8ZWJMSHJ
8JY9TU' T JX
3JY TWSL 8 XJRX
(TSXZRJW QHMTSNDX
, JSJWQ5ZWTXJ

OBS PPL K E P L O V

349* 5FLJ SZRGJWKTWW NTZXW NTSXRF I KJWTR UFLJ SZRGJWNS YJ HZWYSY J WTS

7J NTS 7JQFXJI Y 2FWJY

7J NTS : U FY .VNS UFLJ FS HTWVHY9 5 NS*(YGQ

7J NTS : U FY 5&(0&, * .3+472&9.43 849

7J NTS : U FY) * .(* 47) *7 .3+472&9.43

7J NTS : U FY &' 8 9/ RF FS FI 281 NTRFYS

ABS F EL OABO K C L O EL K

8(9	9 &7	9FW	7JJQ				
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MKCRK FLKP?

.3			5T JWKZUQ NSUZY .3 XZUQX YW UT JWT YW .(FX JQFX YW XYU IT S HTS JWMWX NMX) WJ .3 NMF Y UT JWXZMW ' UFX .3 Y , 3) NMF XZFGQ QWJ HFUHNWWT JORNFY STXJ TS YW NSUZY YW .(8JJ .SUZY(FUFHNTW
8			5T JVB NMSL 4ZYZY 8 X YW X NMSL STI J WYXZUQX UT JWT YW TZUZY (TSSJHY YW TZUZY1(KQVWTR 8 Y YW TZUZYQFI 3TY WYF HFUHNWV WVN WTR 8 Y ' 89 Y UT JWM MNMXNJ X NFM
, 3)			5T JWLWZSI 2 ZYGY XTQJW I NWHQ Y L WZSI UQSI
' 89			5T JWKZUQ KTW WJ MNMXNJ UT JW2 48+*9 LFY I WJW2 ZXYHTSSJHY F Z+ TW WY V WJ WTR N HFUHNWGY JJS' 89 USFSI 8 STI J
* 3			* SFGQ QLIN NSUZY +QFYS YW US JSFGQX YW I J NU 9MJ I J NU MFX UWHTS JSFGQ YW XMTQX WNSL KQVL KTWUWL WRRFGQ : 14 YW XMTQ FSI MXYWXX
+			' ZP HTS JWMWTZYZY KJI GFHP XJSXSL TOFLJ (TSSJHY F WXXYTW I NNJWTR 4: 9 Y + ' Y XJYZUTZYZY TOFLJ 9MJ I J NU WLZQYX+ Y YW SYWFGQK WSHU TK YUNFQ

OB L BKABALMBO HKD? LKAF FLKP?

4 JVTWVYSL K WJ FNWRUWVZW VSLJ ZSQXTWJ WNK STYI

.3		.SUZY TOFLJ WSLJ		
9/		4 W VYSL QZSHNTS YR W VZW		(

BPAID HKDP?

8)		- ZRFS' TI 2 TI JQ ' 2 UW&38./) *(/8 XUHNHNTS FQNSX		P
		(MFWJI) J NU 2 TI JQ) 2 UW&38./*) *(/8 XUHNHNTS FQNSX		P
- ' 2 FSI () 2 XWXXSL FWI TSJ NFFHTWFSU NMYU &38.*8) & /*) *(/8		XUHNHNTS		

EBO I HKCLO FLK?

7 /&		/ ZSHNTS Y FR GN SYW VRFQWXXFSHJ		(
7 /(		/ ZSHNTS Y HFJ YW VRFQWXXFSHJ		

8(9 UW INJX7 /&FSI 7 /(SZRGWTSQ FX W K WSHU Y JXRFY QZSHNTS YR W VZWXTKW I J NUX 7 /&FSI 7 /(FWSTYF
HMFVWVWVNI TKUFHFLJ NQ G ZYTKRFS TYWVX XYR Q JHMFVWVWVX XZMFX YW I JXNSFS Q ZYTKW UNFYI HNAZY
GTFW 5(' TS MNMY 8(9 FWRTZSYI FSI J YW FQIS NTSRJSYFQHYTW 9MJ 5(' GTFW X F MIFYXSP YFYX XTQJW
Y YW QFI XFS YW VRFQFI TKW 8(9 (MSLSL YW I JXNSTVHTS W ZVNTS TKW 5(' GTFW HVS LJX YW JKNN SH TKW
MIFYXSPFS YW WKTW YW FHZFQ /&FSI 7 /(



+TWR TW NTRFYS

XMTSYSHTR

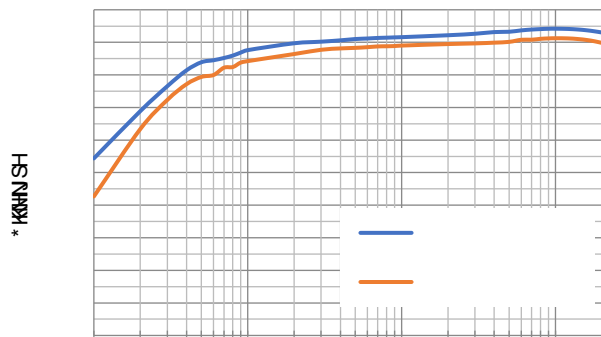
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5W ZH+TQJWNPX 8(9

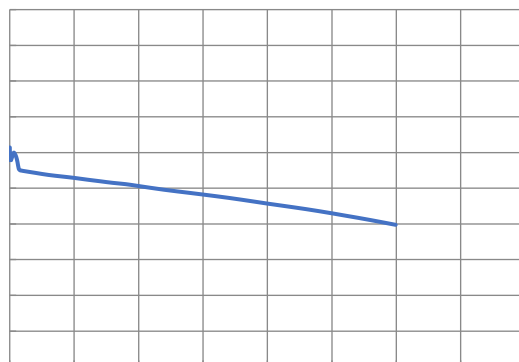
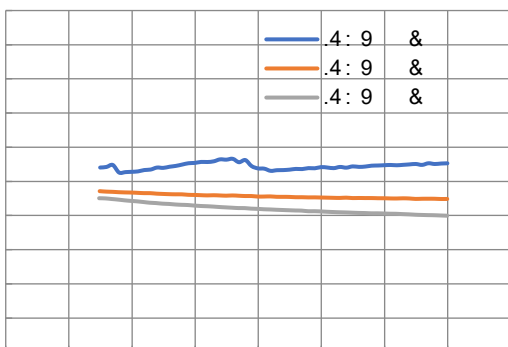
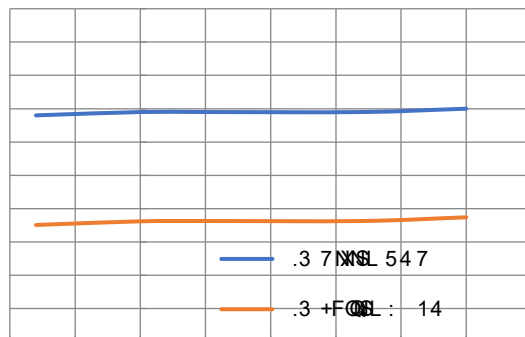
BI B OF I E O BOP F P

.3	9/ (c (YUNFQFQJXFWYXXI ZSI JW (			
.3	4 U W W S L N S U Z Y T O F L J			
.3D: 14	.SUZY: 14 - X Y W X X	.3 W W S L		R
.8)	8 M Z Y T S H Z W W S Y	* 3 3 T Q F I .3		Z&
.6	6 Z N X H S Y H Z W W S Y	* 3 3 T Q F I 3 T X N W S L .3 ' 89 8		Z&

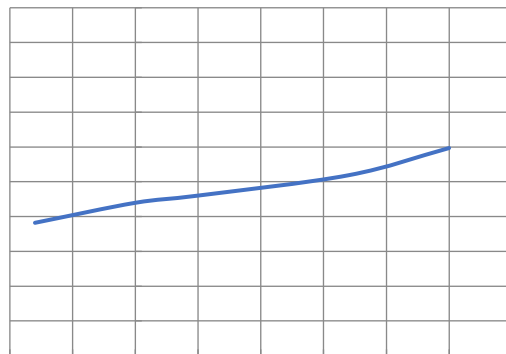
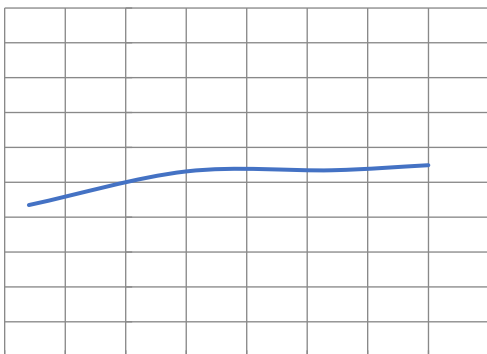
VMF I E O BOHP F P



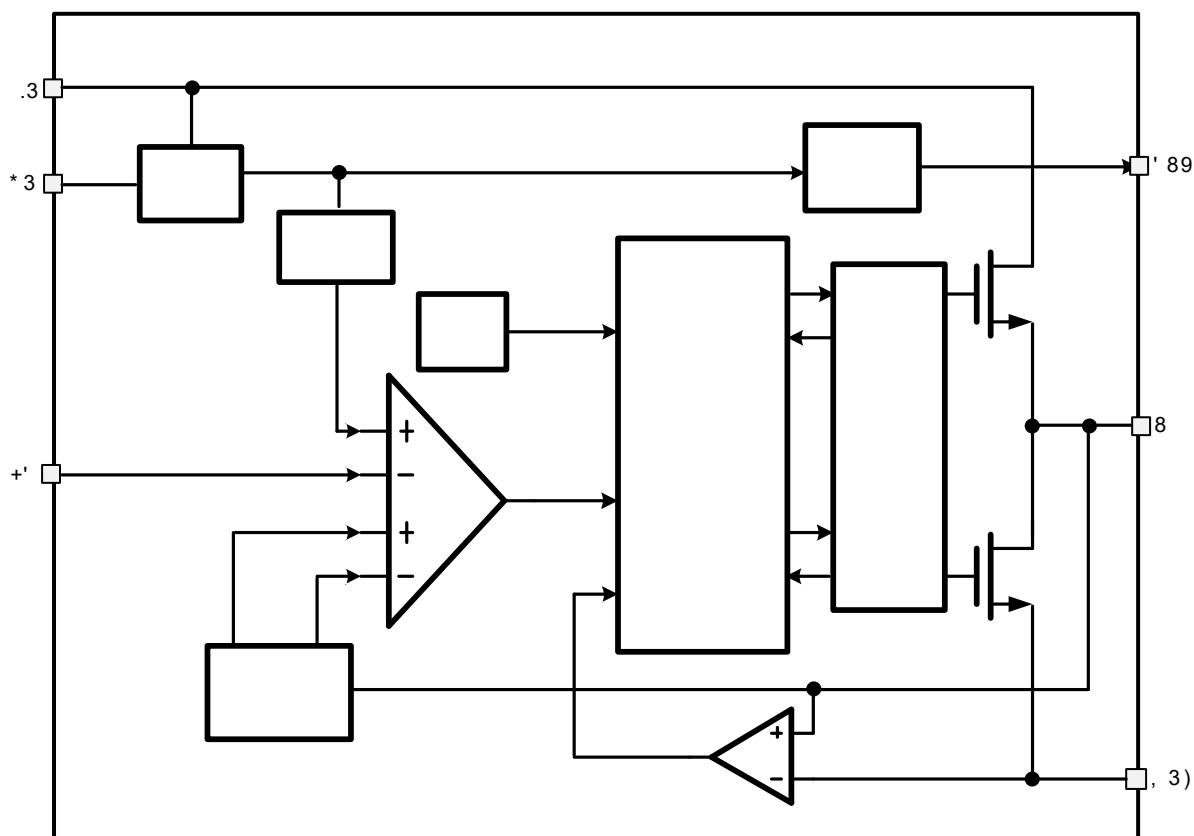
4 ZYJZY(ZWISYR&



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LMB0 FLK

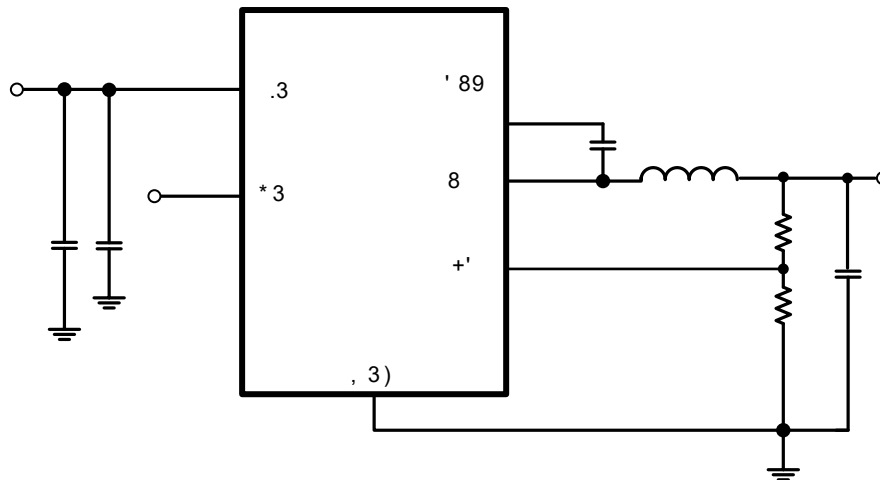
9MJ 8(9 IJ MU NX SUZY & TZUZY X SHMTSTZX XJUI T S HTS JWMX NM SYWQUT JW
248+*9X &I FUNJ HTSXF SYTS YRJ &(49 HTSW

.S J F H M X N H M S L H H Q Y W I S I Z H T W F Z W S Y X X J S X I G R T S N T V S L Y W Q X N J 2 4 8 + * 9 I Z V S L Y W 4 + + U W V I
M I S Y W T O F L J G Y J J S , 3) U S F S I 8 U S I X Q J W W F S Y W T J W H Z W S Y M W X M T Q T O F L J Y W 4 (5 N Q J
Y M L J W I F S I Y W H T S Y T Q W P J J U X Y W 4 + + X F Y I & S J X N H M S L H H Q N Q G I L S T S Q M I S Y W R J F X Z W I
T O F L J I X M M W W F S O R N Y T O F L J . K T Z Y Z Y Q F I S L H T S Y S Z J X Y T S H W F X J T Z Y Z Y N Q W U W I G I Q Y W : 5
F S I 8 8 U S I X I X H M F W J I X Z H M Y F Y T Z Y Z Y I X 9 M I S Y W I J N U N Q H T Z S Y K T W H H Q X T K X T Y X F W Y R J K T W
M H Z U F N S L Y R J F S I W X F W S T V R F Q F K J W H H Q X X T K Y X F W U W I

& S J Y W F Q G T T X Y W U H F U F H N T W G J Y J J S ' 8 9 F S I 8 U S U T J W K O F Y S L M M X N J U T J W 2 4 8 + * 9 L F Y I W J W
9 M G T T X Y W U H F U F H N T W T O F L J I X H M F W J I K V R F S N S Y L W Y I T O F L J W L Z Q Y T W M I S M M X N J U T J W 2 4 8 + * 9
I X T K F S I Q X N J U T J W 2 4 8 + * 9 I X T S

4 S H Y W Q Z S H T S Y R U W F Z W I S Y W 8 (9 J H J I X ° (Y W Y W R F Q X J S X S L H N A Z Y X T U X H T S J W W
X N H M S L F S I W X F W K N M Y W Q Z S H T S Y R U W F Z W K F O L G I Q ° (9 M W R F Q M Z Y T S U W J S X Y W I F R F L J
T S I J N U I Z V S L J H X X N J M I F Y S I U T J W I X X U F Y T S H T S N T S

MM F H L K K C L O H L K



.SUZY TO FLJ	
4 ZUZY TO FLJ	
4 ZUZY(ZW SY	&
8 NMSL + WZJSH	P-

+TWLTTI SUZY TO FLJ KOWSL HMTXJ Q * 87 HJWRNHFUFHNTW & HJWRNHFUFHNTW + N WHTRRJSI JI
KTWWJ I JHTZUOL HFUFHNTWFS F + HJWRN G UFXX HFUFHNTW WHTRRJSI JI YI GJ UGHJI FXHQJ FX
UTXXHQ YI WJ .3 US TKWJ 8(9

: XJ * VZF YTS YI FQZCY WJ SUZY TO FLJ WUQ

$$\Delta = \frac{1}{x} \times \frac{V_{OUT}}{V_{IN}} \times (1 - \frac{1}{x})$$

FUQIF YTSX (MITXJ YU WMMHFUFHNTWFQJ HFVKZQ NMHTSXNJVL MLMHFUFHNF SHU HUVRNIHFUFHNTX) (GRXJKJHY MHHMFXF XWVSL NQJSHU TS YU NSFQJKJHNJ HFUFHNF SHU

9MU WWTWRF SHU TKNS ZHTWFKJHX YU UT JWKZUQX XYFI XFY TUWVNTS YFSXNSYGMF NTWQTU XFGQY
FSI GZPHTS JMWVKHNSH 9MU NS ZHTWFQJ)(WXXF SHU)(7 FSI XFZVNTS HZWSYNSQJSHX GTM
JKHNSH FSI YU RFLSN J TKYU TZUZY TQFLJ WUQ 1FWJWSI ZHFSH FQJ W ZHUXNS ZHTWZWSYWUQ
FSI YUWKTW QFI XYT Q JVTZUZY TQFLJ WUQ +TWFKNJI)(7 F QWJWFQJ NS ZHTWNQXMMJWKHNSH
IR W ZHI 728 FSI HTW QXXJX - T J JWF QWJWSI ZHTW NMSFLNJS NS ZHTWERNQ NQJJSJWQ MF J F
LWFYVWJWXXF SHU YUWG HTZSYVHNSL YMKJKHNSH FI FSFLJ

.SI ZHTW FQJX HFS MF J TWJ JS YQWVSH NM ST HZWSYGRX MJS YU NS ZHTWZWSY
FUWTFHMXXFZVNTS Q JQNK NS ZHFSH FSI JHMFJ Y KTR YU FQJ FY & HZWSY JUJS NS TS
MT YU NS ZHTW JS TW JKSJX XFZVNTS MJS XJQHNSL FSI NS ZHTWHMITXJ NK WYI HZWSYJXWHTQ YU
XFZVNTSHZWSYQWJWVFS NKWFPHZWSY ZNSL YU TWVNTS

9THFQZGY YU HZWSYNS YU TWYFXJ ZXJ YU RF IRZR NSUZY TQFLJ RNSRZR TZUZY TQFLJ RF IR QFI
HZWSYFSI RNSRZR X NMSL KWZJSH TKYU FUQIF YTS MQ HTSXNJVL YU NS ZHFSH NM YQWVSH
FSI Q UT JVHTS JVNTS JKHNSH

+TWFGZPHTS JMWVHFQZGY YU NS ZHTWRNSRZR FQJ FXXMT SNSJVZFYTS

$$= \frac{x \left(\begin{matrix} & - & \end{matrix} \right)}{x \quad x \quad x}$$

MJW

0.3) NKYU HTJKHNSYTKNS ZHTWUWUQ HZWSYWQNJ Y YU RF IRZR TZUZYHZWSY

9MUWKTW YU WFPX NMSL HZWSYTKNS ZHTW.15*&0 NKFQZGYI FXNSJVZFYTS

$$= \quad + \quad \times \frac{\quad}{2}$$

8JYYU HZWSYQNTKYU 8(9 MLMJWVFS YU WFPHZWSY.15*&0 FSI XJQHYU NS ZHTW NYU XFZVNTS
HZWSYMLMJWVFS YU HZWSYQNY 9MU NS ZHTVK)(WXXF SHU)(7 FSI YU HTW QXX XLSNHSQ FKJHYU
JKHNSH TKUT JVHTS JVNTS (TW QXXNKWQYI Y YU HTW RFYVTFQSI IKJWSYNS ZHTW MF J IKJWSYHTW
QXX +TWFGZVFS NS ZHTWQWJWHZWSYWUQ LJSJWYX MLMJW)(7 FSI *87 HTS ZHTS QXXJXFS MLMJW
HTW QXX

9FGQ QXWHTRRJS JI NS ZHTWKTWU 8(9 JVK MJYUWU WHTRRJS JI NS ZHTWFSXZUTWU
ZXJYFYWJFUQIF YTS NYU UW NTZXHFQZGYTSXFS GJSHJ FQFYTS .SYXFUQIF YTS YU *XNS ZHTW
NKXJI TS8(9 J FQFYTS GTFW

					ZVM* QHWSIP

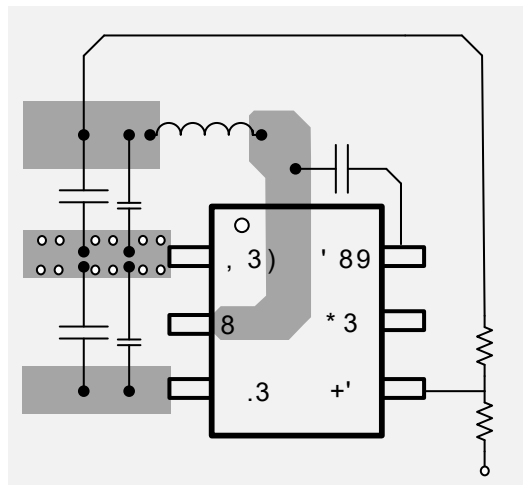
9MJ 8(9 KIFZWXJ YWFCUMLWRRFGQ TZUZY TOFLJ G ZNSL F WXXYTWNNJWSJY TW 7 FS 7 FX
XMT S\$WJ YUNFCUQDFYTSNNZV+NZW : XJ JVZFYS YHFCZY WJ WXXYTWNNJWFQJX

$$_1 = \frac{(\quad - \quad) \times \quad}{_2}$$



9MJ WLZQYVHTZQ XZKJWVTR NSXFGQY FSI STXJ UVGQRX NMZYHFVWZQ @ TZYTK5(' 7FI RYTS TKMNM KVVZJSH STXJ NS ZHUX*2. XT UVUJW@ TZYTKYU MUMKVVZJSH X NFMSL UFYMKJXXSYFQ2NSRNJ YU QSLYFSI FWF TKFQYVUX HTSSJHYI YT YU 8 UNS FSI FQF XZXJ FLVZSI UGSJ ZSI JWYU X NFMSL WLZQYVHT RNSRNJ HTZU@ 9MJ NSUZYHFUHNVSJJI XYTGJ JWHQXJ YTYU .3 UNSFSI , 3) UNS YTYU ZHU YU NSUZYXZUUQ WUQ 5GHU YU HFUFHNTWFX HQXJ YT .3 UNS FX UTXXQY YTYU ZHU MUMKVVZJSH V@NSL T@FLJ TS8 UNSFX JQ+NZW NYU WHTRRJSI JI 5(' @ TZYTK8(9

9MJ @ TZYSJJI XGJITSJ NM JQHTSNJWYTS TKYU YUVRFQ& @WJ YTU @ JVLVZSI U@Y ZNSL RZ@UQ YUVRFQ NYXZXJI YTYU UV J YU YUVRFQ NYUFTS 9MJ GYTR @ JVKF @WJ LVZSI UGSJ HTSSJHYI YTYU YTU @ JVLVZSI G NYX



9MJ RF NRZR.(QZSHNTSYRUVWVZW XMTZQ GJ WXYMYI YT (ZSI JVSTVRFQTUVVYSL HTSI NTSX (F@ZQY YU RF NRZR F@ FQ I NYUFTS 5) RF FSI PJJU YU FHZFQT JW NYUFTS QXX YFS TWVZFQT 5) RF 9MJ RF NRZR UT JW NYUFTS QNYXI JYVRNSJI ZNSL * VZFYTS

$$() = \frac{125 -}{\theta JA}$$

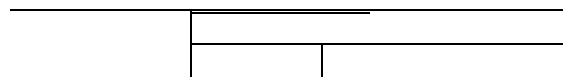
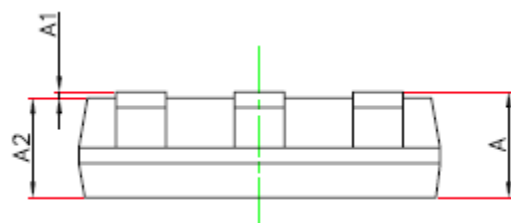
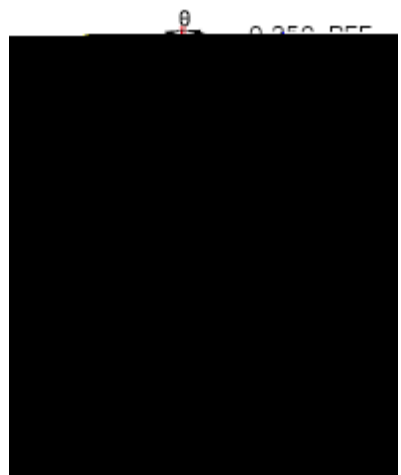
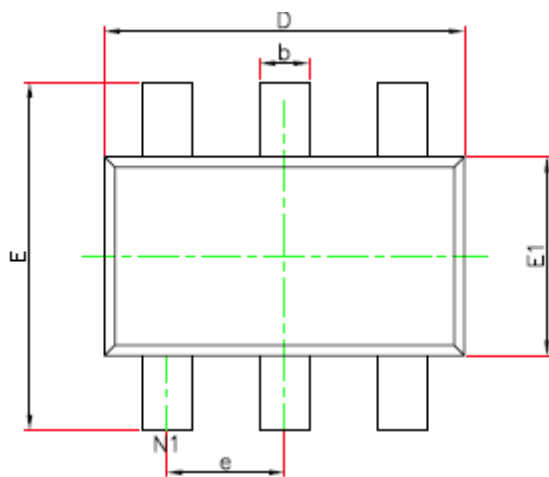
MJW

9& NYU RF NRZR FRGJSYRUVWVZWKTVMU FU@FYTS

7 /& NYU QZSHNTSY FRGJSYUVRFQVXXFSHU LNJS NS YU 9MJVRFQSKVRFYTS YFQ

9MJ WFFQZSHNTSY FRGJSYUVRFQVXXFSHU 7 /& TKYU UFHFLJ LWFQI JWJS XTS YU 5(' YU @ TZY YUVRFQFI HTSSJHYTS FSI JS NTSRJSYFQHFW: XNSL YNFP 5(' HTUJVFSI XTQJNSL YU , 3) YTYU F @WJ LVZSI U@Y JSMFHU YU YUVRFQUVVRFSHU : XNSL RTW NYXHTSSJHYX YU LVZSI U@Y TS YU YTU @ JVFSI GYTR @ JVFVZSI YU.(NMZYXTQJVRFXPFQT JSMFHU YU YUVRFQFUFQY

M H DBK CLO FLK PL



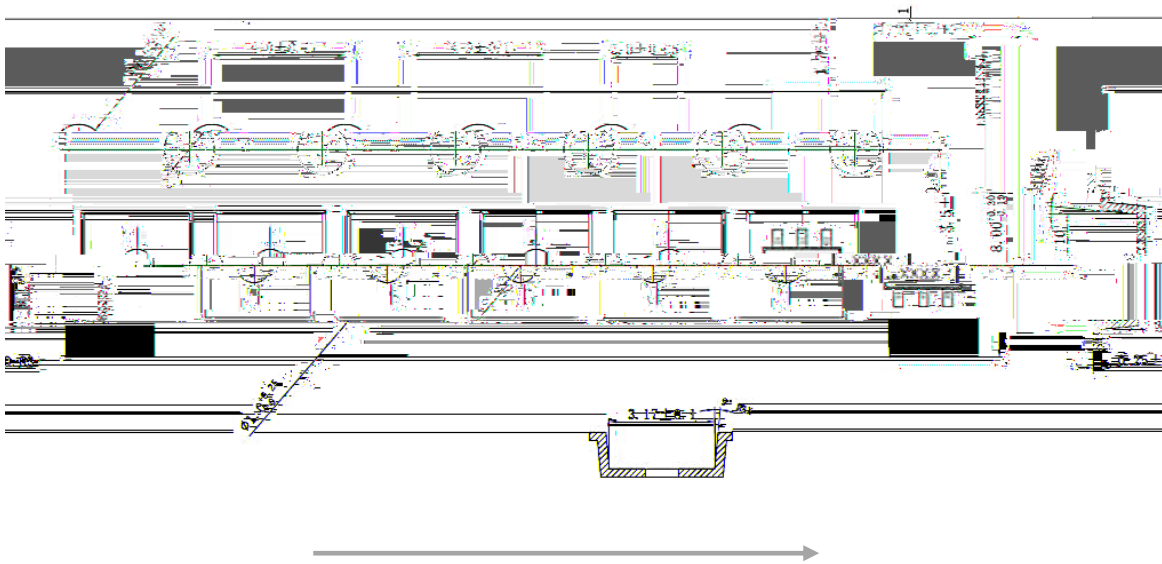
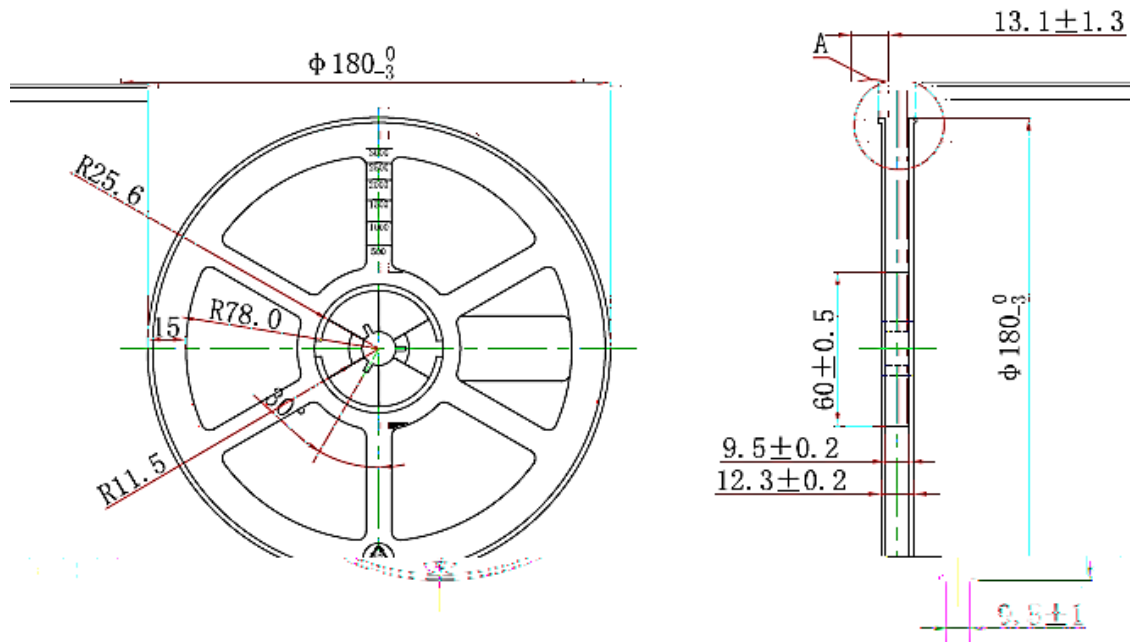
M H DB?FKCL O

FL K? PL

[?]



MB2 KA2OBBI 2KCL O FLK77



MB? KA?OBBI ?FKCL O

FL K?

