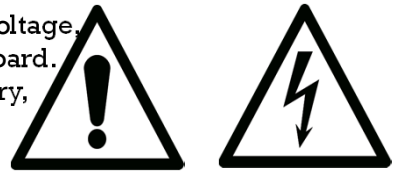
Dialog QC3.0和PE+不同的IC应用选型

...personal
...portable
...connected

ZhangQiang
July-2016

Warning

Warning
This evaluation board is powered either by the AC mains voltage or a low AC or DC voltage. When powered by the AC mains voltage, the evaluation board generates non-insulated high voltages on exposed pins and pads on both the top and bottom of the PC board. Contact with these may produce electrical shock, burn, and/or fire hazards, resulting in risk of property damage, personal injury, and/or death. When the design indicates isolation, the output(s) is electrically isolated from the AC mains input voltage.



When the evaluation board is powered, never touch the board or its electrical circuits since they may be operating at high voltages that can cause an electrical shock hazard.

WORK AREA AND PERSONAL SAFETY
This board should be used in a test area/laboratory specifically designed and designated for working with, and evaluating high-voltage electrical devices. Only trained and qualified professional personnel with experience, knowledge and training in the use of high-voltage electrical circuits should use this evaluation board. Trained personnel must use required personal protective equipment and required laboratory equipment when working with the evaluation board.

The professional personnel operating this evaluation board and the test area/laboratory in which it is operated must be qualified according to the local regulations, guidelines and labor laws applicable to working with non-isolated mains voltages and high voltage circuits.

An isolated housing is highly recommended when using this evaluation board.

Use this evaluation board at your own risk.

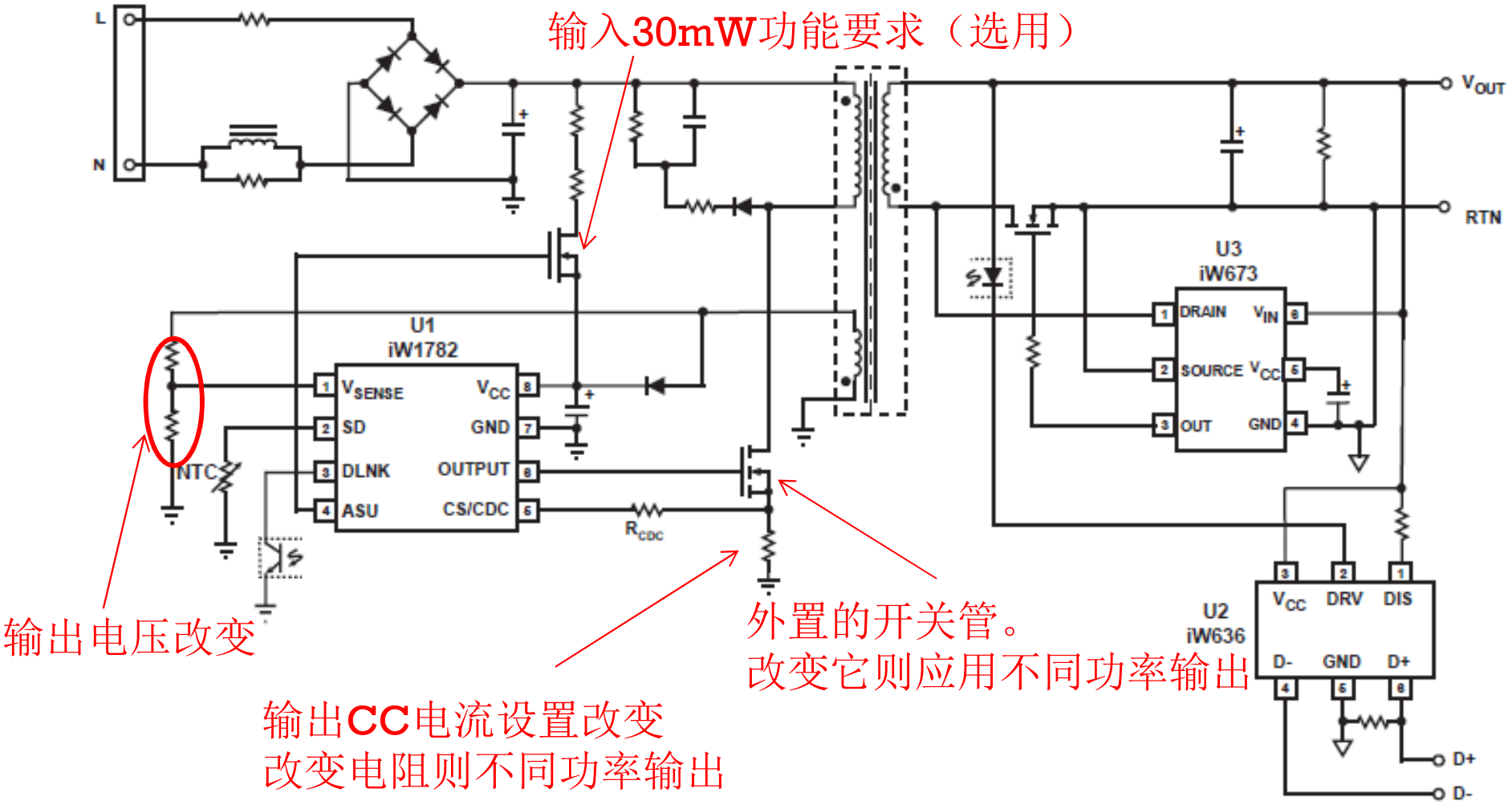
TO BE USED FOR EVALUATION PURPOSES ONLY
This board is intended for evaluation purposes only and not intended for commercial use in an end product. Any other use is strictly prohibited by Dialog Semiconductor.

NOT AGENCY APPROVED
This evaluation board has not been agency tested or approved for safety, technical performance, and/or regulatory requirements, such as electromagnetic interference or other technical regulatory or safety requirements.

RapidCharger Chipset Selector Guide

Primary Controller	Secondary Side IC	P_{MAX}	SR IC	Qualcomm® Quick Charge™ 2.0	Qualcomm® Quick Charge™ 3.0	SmartDefender™	D+/D- Protection	V_{OUT}								
								3.6V to 5V	3.6V to 6V	3.6V to 6.8V	3.6V to 8V	3.6V to 9V	5V	7V	9V	12V
iW1780-00	iW626-02	36W	iW673	✓									✓		✓	✓
	iW626-04	36W	iW673	✓									✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1780-01	iW626-00	36W	iW673	✓		✓							✓		✓	✓
	iW626-20	27W	iW673	✓		✓							✓		✓	
iW1780-03	iW626-00	36W	iW673	✓		✓							✓		✓	✓
	iW626-20	27W	iW673	✓		✓							✓		✓	
iW1780-04	iW626-02	36W	iW673	✓									✓		✓	✓
	iW626-04	36W	iW673	✓									✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1780-06	iW626-02	36W	iW673	✓									✓		✓	✓
	iW626-04	36W	iW673	✓									✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1780-07	iW626-02	36W	iW673	✓									✓		✓	✓
	iW626-04	36W	iW673	✓									✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1780-09	iW626-02	36W	iW673	✓		✓							✓		✓	✓
	iW626-04	36W	iW673	✓		✓							✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1780-23	iW626-02	36W	iW673	✓		✓							✓		✓	✓
	iW626-04	36W	iW673	✓		✓							✓		✓	✓
	iW629-24	27W	iW673	✓									✓		✓	
iW1780-30	iW626-02	36W	iW673	✓									✓		✓	✓
	iW626-04	36W	iW673	✓									✓		✓	✓
	iW629-24	27W	iW673	✓			✓						✓		✓	
iW1782-00	iW636-05	36W	iW673	✓	✓	✓	✓						✓	✓	✓	✓
	iW636-06	36W	iW673	✓	✓	✓	✓				✓		✓	✓	✓	✓
	iW636-21	27W	iW673	✓	✓	✓	✓					✓	✓	✓	✓	
iW1782-01	iW636-00	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-02	36W	iW673	✓	✓	✓	✓			✓			✓	✓	✓	✓
	iW636-07	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-08	36W	iW673	✓	✓	✓	✓				✓		✓	✓	✓	✓
iW1782-03	iW636-00	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-02	36W	iW673	✓	✓	✓	✓			✓			✓	✓	✓	✓
	iW636-07	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-08	36W	iW673	✓	✓	✓	✓				✓		✓	✓	✓	✓
iW1782-05	iW636-00	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-02	36W	iW673	✓	✓	✓	✓			✓			✓	✓	✓	✓
	iW636-07	36W	iW673	✓	✓	✓	✓		✓				✓	✓	✓	✓
	iW636-08	36W	iW673	✓	✓	✓	✓				✓		✓	✓	✓	✓

Rapid charger with iW1782&iW636&673



iW1782 and iW636 系列芯片

- iW1782 和 iW636 是一套应用数字控制模式的可以同时支持高通的QC3.0和QC2.0方案，同时它还能可选性地支持MTK的PE+充电方案
- iW1782 是一个初级控制，当它采集到次级来自于IW636的信号后，可以自行改变输出 电压 和输出 电流， 这都是来自于IC内部对输出特性的直接修正，不需要增加或改变外围元件。 当它没有检测到次级IW636信号时，可以满足MTK的电流信号，并达到MTK的PE+快充

- iW636 是一个次级采集并沟通QC3.0和QC2.0的协议IC， 它通过了高通的官方认证。它将采集的信号通过Dlnk脚反馈给初级IW1782，改变输出特性，这是一个纯数字信号，因此更安全并可靠。

- Dialog iW1782+iW636 支持 QC3.0模组，能有效的降低BOM，并有更多的保护功能。

- IW636同时具有次级pin脚D+/D-的OVP保护功能，且具有次级的输出电压OVP保护功能，它能有效的检测输出电压 ，并快速传递给主回路，将整个电源关断

D+ OVP threshold	V_{DP_OVP}		4.3	4.5	4.7	V
D- OVP threshold	V_{DM_OVP}		4.3	4.5	4.7	V

输出电压电流的特性及控制

IW1782+IW636控制输出更为准确，并有更好的功率保护限制

5V CC limit should be determined by $I_{CC\_Limit} = \frac{k_{CC}}{2} \times \frac{N_{ps}}{R_S} \times \eta_x$

where k_{CC} is the CC limit coefficient and it can be 0.5 or 0.422 at startup determined by product options, η_x is the transformer conversion efficiency

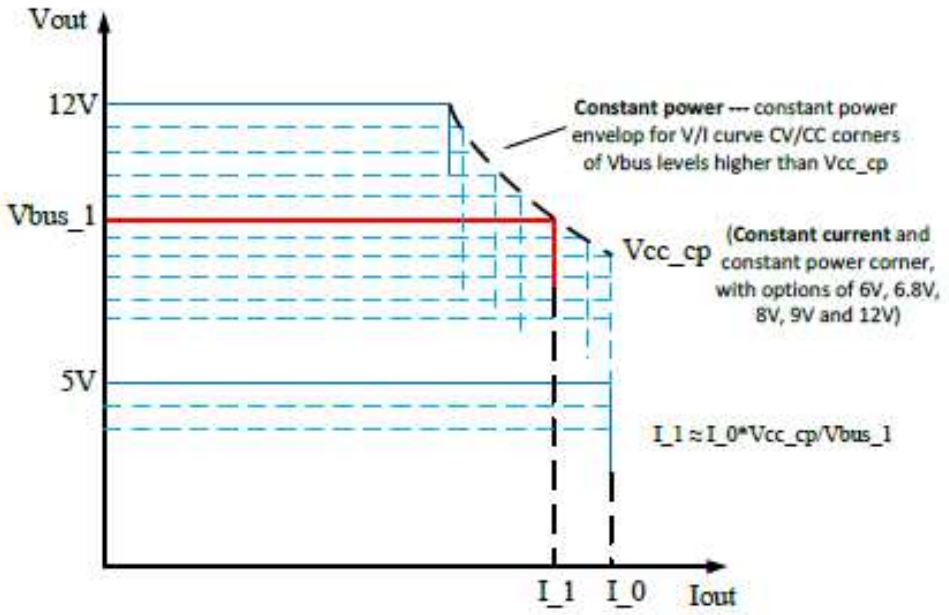
CC limits at other V_{BUS} levels are determined by the current information from iW636 predetermined by product options of iW636. The k_{CC} values are automatically adjusted by digital controller according to the current information received through DLNK pin

After 5V CC limit is determined, V_{BUS} settings between 3.6V to 4.8V have the same CC limit as 5V (I_0 as shown in the figure)

V_{BUS} settings between 5V and CC_CP (constant power) corner have the same CC limit as 5V (I_0 in the figure)

V_{BUS} settings above CC_CP corner (for example V_{bus1} as shown in the figure) have the CC limits determined by constant power envelop (I_1 as shown in the figure) approximately

Several V_{BUS} steps may share one CC limit due to the minor change of calculated CC limit between adjacent V_{BUS} steps



从上面公式可以看出，我们的电流只和KCC和Risense检测电阻和圈比有关
在我们的设计是Risense和圈比都是固定的，那么我们只需要改变Kcc这个常值
则可以更好的控制输出电流和功率

理解IC 内部的控制因素

IC内部参数。这个Kcc决定启时OCP, 需要对应后面iW636一起应用选型

Part Number	Options					Package	Description
	Protocol Supported	Default K_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]	Rated Max Current at PE+ Mode	Rated Max Power at PE+ Mode		
iW1782-00	QC3.0/PE+	0.422	3V	1.67A	15W	SOIC-8	Tape & Reel[2]
iW1782-01	QC3.0/PE+	0.5	3V	3A	18W	SOIC-8	Tape & Reel[2]
iW1782-03	QC3.0/PE+	0.5	No CC operation and latch	2.5A	15W	SOIC-8	Tape & Reel[2]
iW1782-05	QC3.0/PE+	0.5	3V	3A	24W	SOIC-8	Tape & Reel[2]
iW1782-19	PE+	0.422	3V	2A	18W	SOIC-8	Tape & Reel[2]

Part Number	Options				Package	Description
	Supported Protocol	V_{BUS} Range	K_{CC}	OVP Threshold if Non-QC-Equipped MD is Attached		
iW636-00	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	N/A	SOT-23	Tape & Reel[1]
iW636-02	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6.8V; Determined by constant max power for 7V to 12V	N/A	SOT-23	Tape & Reel[1]
iW636-04	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 9V; Determined by constant max power for 9.2V to 12V	N/A	SOT-23	Tape & Reel[1]
iW636-05	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 9V; Determined by constant max power for 9.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-06	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-07	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-08	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-21	QC3.0	3.6V to 9V	0.422 for V_{BUS}=3.6V to 9V	11V	SOT-23	Tape & Reel[1]

恒功率分阶点，决定电流
对应0.422/0.5选择1782

iW636的OVP电压。
N/A表示每段电压都有对应的OVP。不能用于PE+

IC 控制因素与输出特性的关系

因市场方案众多，每个客户都有自己的定义，
现我们的IC都是规格一个分队点后则恒功率设计，所以选型只需要根据功率点的不同来选择就好。
当PE+方案，是根据IW1782-xx的直接功率选择IC（并能确认功率转换电压点）
而QC3.0方案时，根据IW636-xx不同的后缀选择转换电压再乘以你的设置电流来达到你的设计规格。

QC3.0兼容MTK的用到哪几个后缀的芯片？输出电压电流分别是多少？
只有IW636-00和IW636-02不可以兼容MTK。其它全部可以（iW636-02和IW636-00只是电压转换点不同，iW636-02是6.8V）
输出电流则需根据你自己想要的功率来选择，我们只是规定全部恒功率

仅做PE+2.0用到哪几个后缀的芯片，输出电压电流分别是多少？
iW1782全部可以做PE+2.0方案，
输出电流大小根据自己设置，我们也只是规定恒功率大小。功率转换点可以根据功率要求直接算出
P=Vout*Iout

注意：我们有一个默认电流值。
那么iW1782-01是18W默认电流3A ： 规格就是 5V3A 6V3A 9V2A 12V1.5A
而1W1780-00是15W 默认电流是1.67A:规格就是 5V1.67A 6V1.67A9V1.67A12V1.25A
iW1782-03也是15W而默认电流是2.5A： 规格是 5V2.5A 6V2.5A 9V1.67A 12V1.25A
iW1782-05是24W默认电流是3A: 规格就是 5V3A 6V3A 8V3A 9V2.67A 12V2A

PE+方案IC选择

恒功率选择

Part Number	Options					Package	Description
	Protocol Supported	Default k_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]	Rated Max Current at PE+ Mode	Rated Max Power at PE+ Mode		
iW1782-00	QC3.0/PE+	0.422	3V	1.67A	15W	SOIC-8	Tape & Reel[2]
iW1782-01	QC3.0/PE+	0.5	3V	3A	18W	SOIC-8	Tape & Reel[2]
iW1782-03	QC3.0/PE+	0.5	No CC operation and latch	2.5A	15W	SOIC-8	Tape & Reel[2]
iW1782-05	QC3.0/PE+	0.5	3V	3A	24W	SOIC-8	Tape & Reel[2]
iW1782-19	PE+	0.422	3V	2A	18W	SOIC-8	Tape & Reel[2]

f_{min}=140HZ

f_{min}=2KHZ

初始5V默认电流点

当仅需要PE+方案，准备选用1782时，
请先确认选择功率瓦数，
如18W则是iW1782-01/iW1782-19或者靠近的15W 特性的IC（iW1782-00)

那么iW1782-01是18W， 默认电流3A，　规格就是　5V3A 6V3A 9V2A 12V1.5A
而1W1780-00是15W， 默认电流是1.67A，　规格就是　5V1.67A 6V1.67A9V1.67A12V1.25A
iW1782-03也是15W而默认电流是2.5A:　规格是　5V2.5A 6V2.5A 9V1.67A 12V1.25A
iW1782-05是24W默认电流是3A: 规格就是　5V3A 6V3A 8V3A 9V2.67A 12V2A
iW1782-19是18W默认电流是2A: 规格就是　5V2A 6V2A 8V2A 9V2A 12V1.5A

恒功率的电流转折点是从5V开始算,达到最大功率点之前是恒流模式，
最大功率点之后后则开始变电压降电流模式

PE+方案（low cost方案介绍）

恒功率选择

Part Number	Options					Package	Description
	Protocol Supported	Default k_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]	Rated Max Current at PE+ Mode	Rated Max Power at PE+ Mode		
iW1782-00	QC3.0/PE+	0.422	3V	1.67A	15W	SOIC-8	Tape & Reel[2]
iW1782-01	QC3.0/PE+	0.5	3V	3A	18W	SOIC-8	Tape & Reel[2]
iW1782-03	QC3.0/PE+	0.5	No CC operation and latch	2.5A	15W	SOIC-8	Tape & Reel[2]
iW1782-05	QC3.0/PE+	0.5	3V	3A	24W	SOIC-8	Tape & Reel[2]
iW1782-19	PE+	0.422	3V	2A	18W	SOIC-8	Tape & Reel[2]

f_{min}=140HZ

f_{min}=2KHZ

初始5V默认电流点

请注意，因我们IW1782本是搭配IW636完成同时兼容QC3.0和PE+方案的，
因iW636会快速反应输出状态，所以在我们设计时，IW1782空载频率会达到140HZ。
而此时如果没有IW636搭配使用，将会出现空载状态下，频率大低，输出空满载切换时，
输出电压会关掉一次再重新启动现象，此时需要增加次级动态辅助IC（iW628或者IW671的1,2脚）
并连接光耦到IW1782的Dlnk脚，这样就增加了成本，
此时我们推出一个IW1782-19/iW1780H-22，空载频率达到2KHZ并不需要光耦辅助达到客户要求

IW1782-19输出18W. 5V9V电流一样，9V后恒功率
IW1780H-22输出24W 5V-8V电流一样，8V后恒功率

QC3.0或者兼容PE+方案输出电压电流例子：

11 Ordering Information

Part Number	Options					Package	Descriptio
	Protocol Supported	Default k_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]	Rated Max Current at PE+ Mode	Rated Max Power at PE+ Mode		
iW1782-00	QC3.0/PE+	0.422	3V	1.67A	15W	SOIC-8	Tape & Ree
iW1782-01	QC3.0/PE+	0.5	3V	3A	18W	SOIC-8	Tape & Ree
iW1782-03	QC3.0/PE+	0.5	No CC operation and latch	2.5A	15W	SOIC-8	Tape & Ree
iW1782-05	QC3.0/PE+	0.5	3V	3A	24W	SOIC-8	Tape & Ree

				MD is Attached		
iW636-00	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	N/A	SOT-23	Tape & Reel[1]
iW636-05	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 9V; Determined by constant max power for 9.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-06	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-07	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-08	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-21	QC3.0	3.6V to 9V	0.422 for V_{BUS}=3.6V to 9V	11V	SOT-23	Tape & Reel[1]

从**IW636**里面找到功率转换电压

注意：如上面所说：恒功率的电流转折点是从5V开始达到最大功率前是恒流，最大功率点后则开始变电压降电流

1,前面提到**PE+**方案是按功率点直接算转折点，

2,而**QC3.0**方案是按**IW636-XX**的后缀定义不同的电压功率转折点

iW636-00是**6V**转折，则**6V**时功率最大，

iW636-05是**9V**转折，则**9V**时功率最大

iW636-06是**8V**转折，则**8V**时功率最大

iW636-07是**6V**转折，则**6V**时功率最大

iW636-08是**8V**转折，则**8V**时功率最大

实例：24W QC/PE+

11 Ordering Information

Part Number	Options					Package	Description
	Protocol Supported	Default k_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]	Rated Max Current at PE+ Mode	Rated Max Power at PE+ Mode		
iW1782-00	QC3.0/PE+	0.422	3V	1.67A	15W	SOIC-8	Tape & Reel[2]
iW1782-01	QC3.0/PE+	0.5	3V	3A	18W	SOIC-8	Tape & Reel[2]
iW1782-03	QC3.0/PE+	0.5	No CC operation and latch	2.5A	15W	SOIC-8	Tape & Reel[2]
iW1782-05	QC3.0/PE+	0.5	3V	3A	24W	SOIC-8	Tape & Reel[2]

iW636-00	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	N/A	SOT-23	Tape & Reel[1]
iW636-05	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 9V; Determined by constant max power for 9.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-06	QC3.0	3.6V to 12V	0.422 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-07	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 6V; Determined by constant max power for 6.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-08	QC3.0	3.6V to 12V	0.5 for V_{BUS}=3.6V to 8V; Determined by constant max power for 8.2V to 12V	14.76V	SOT-23	Tape & Reel[1]
iW636-21	QC3.0	3.6V to 9V	0.422 for V_{BUS}=3.6V to 9V	11V	SOT-23	Tape & Reel[1]

Spec: 24W

必须知道具体电流或者知道它的恒功率转折点：a. 5V3A8V3A9V2.67A12V2A

b. 8V转折点

开始选型：

1，因为24W的IC只有IW1782-05且Kcc=0.5

2，对应选取IW636的Kcc=0.5的有：iW636-00/07/08

3. iW636-00是6V转折。所以6*3=18不能满足24W. 并且OVP电压是每段电压都有,不能应用PE+

iW636-07和iW636-08一样，Ovp是最大12V档，适用PE+

iW636-08是8V转折，OVP满足规格，所以适用QC3.0/PE+方案

所以我们兼容方案选择iW1782-05+iW636-08

注意：在QC方案时，初始默认的电流是可以改变电流采样电阻来可调的，但PE+方案不可以自己调。

以上总结：

1,应用iW1782+iW636可以完成QC3.0和PE+兼容方案的设计，并且可以选择应用同个PCB设计完成

a,当你需要全兼容时PCB相对比较简单，参考page5的原理图。

b.当你需要同个PCB兼容并以后只是相对增加或者减小元件完成成本的删减方案时，
可以参考page14的电路图

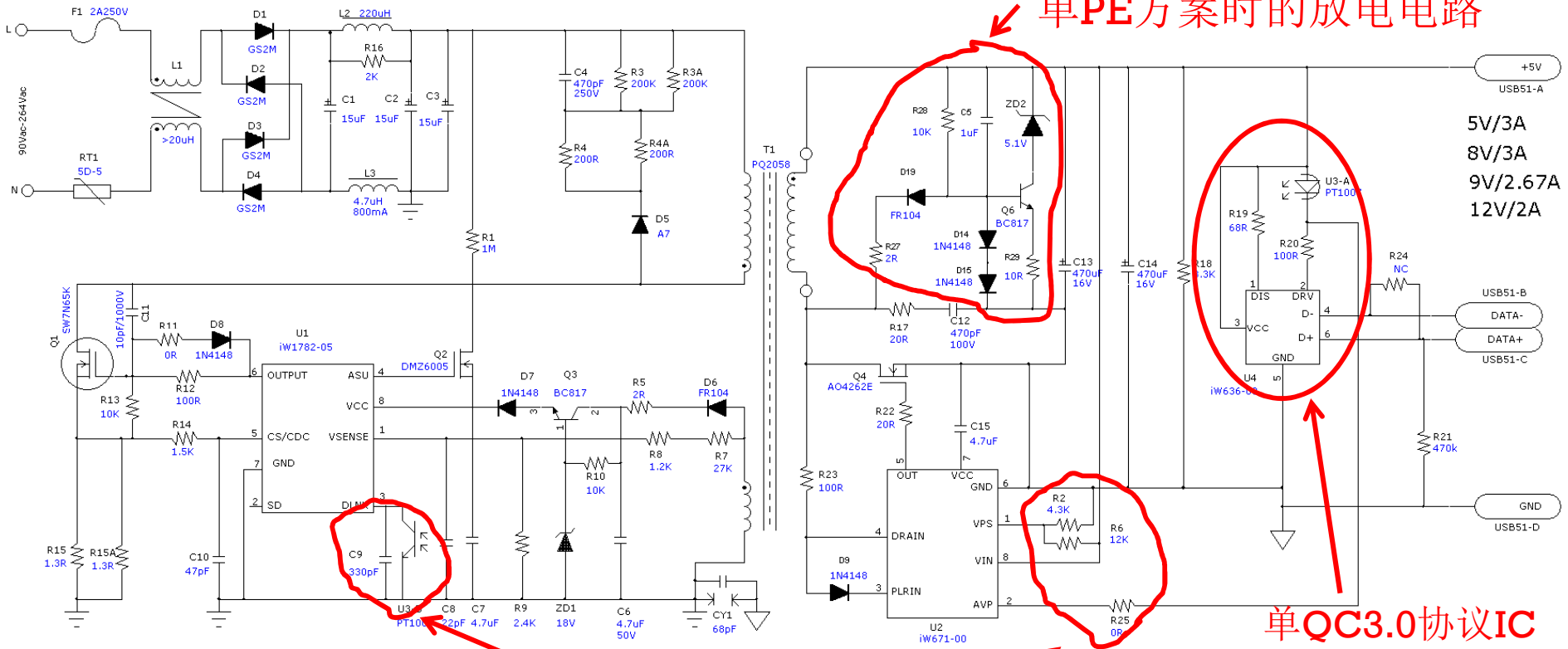
因PE+设计没有输出放电环路，所以需要外加一个放电电路完成

c.当你只需要PE+方案时，可以参考page16的原理图（可以选择多个输出规格）

D, 当你需要18W和24W这2种方案，可以选用我们空载频率2KHZ方案，参考page17的原理图

1. 全兼容QC3.0+PE方案电路图

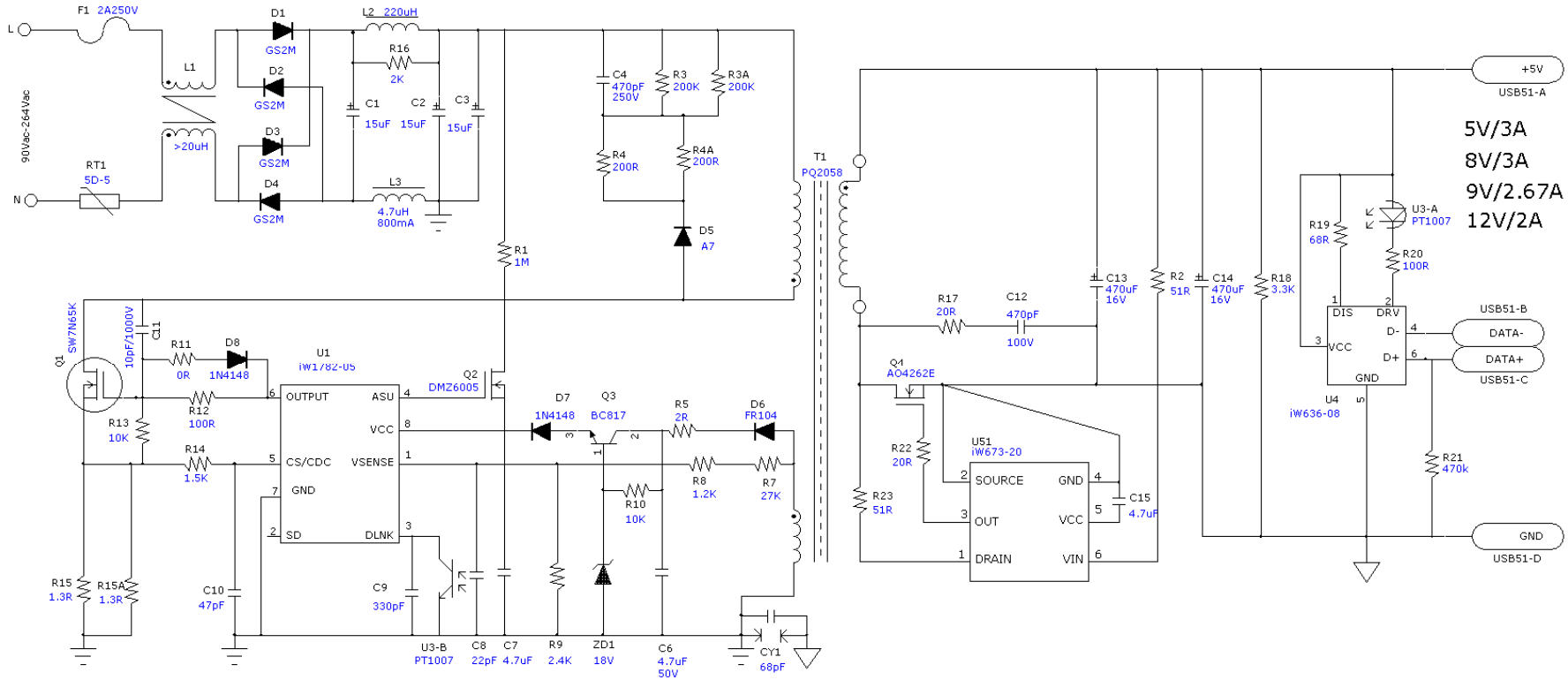
此个方案可以应用同个**PCB**加减元件完成方案更换转型设计
安规相对简单



2. 全兼容QC3.0+PE方案电路图

此个方案可以完全兼容**QC3.0**和**PE**方案，或者单**QC3.0**方案和单个**PE**方案
电路相对简单

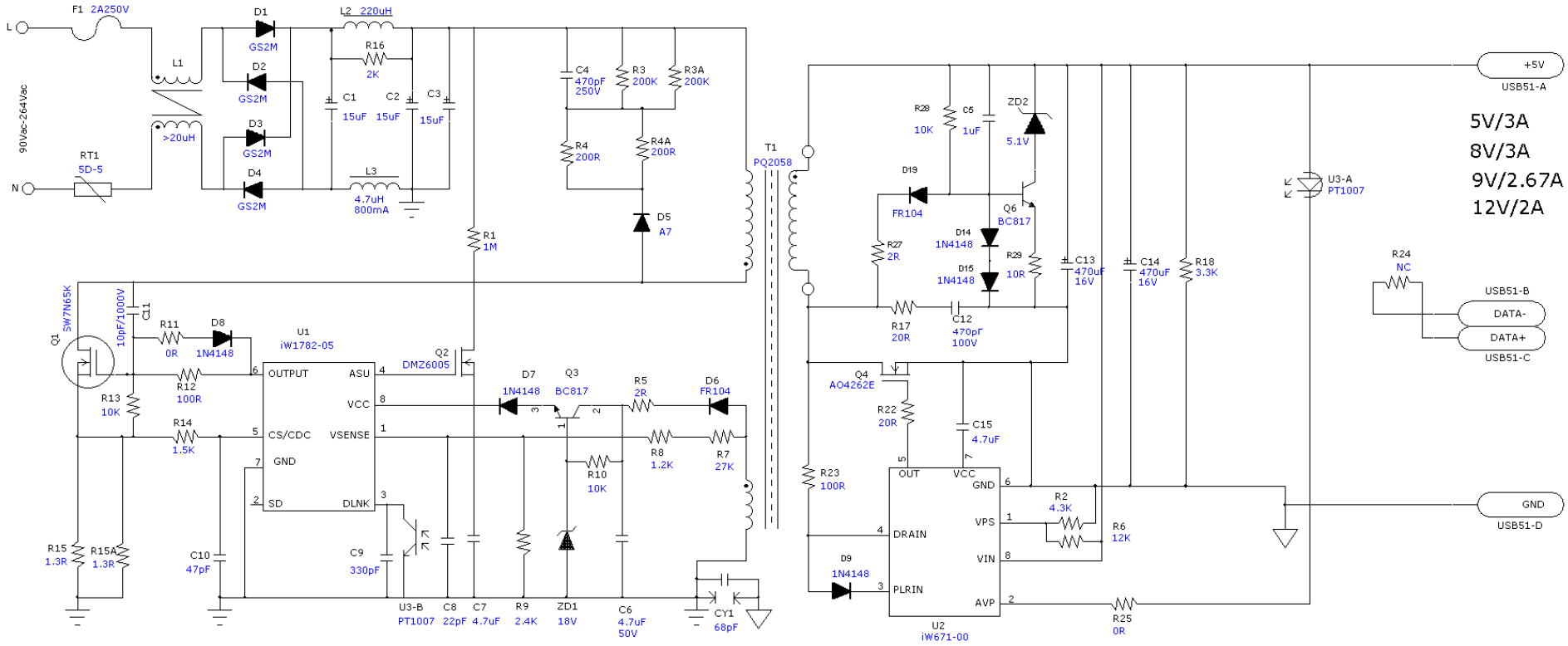
注意：不可以删除任何元件完成单个协议



3. 单PE+方案电路图

此个方案只能满足单个**PE+**方案（兼容**2.0**和**1.1**）

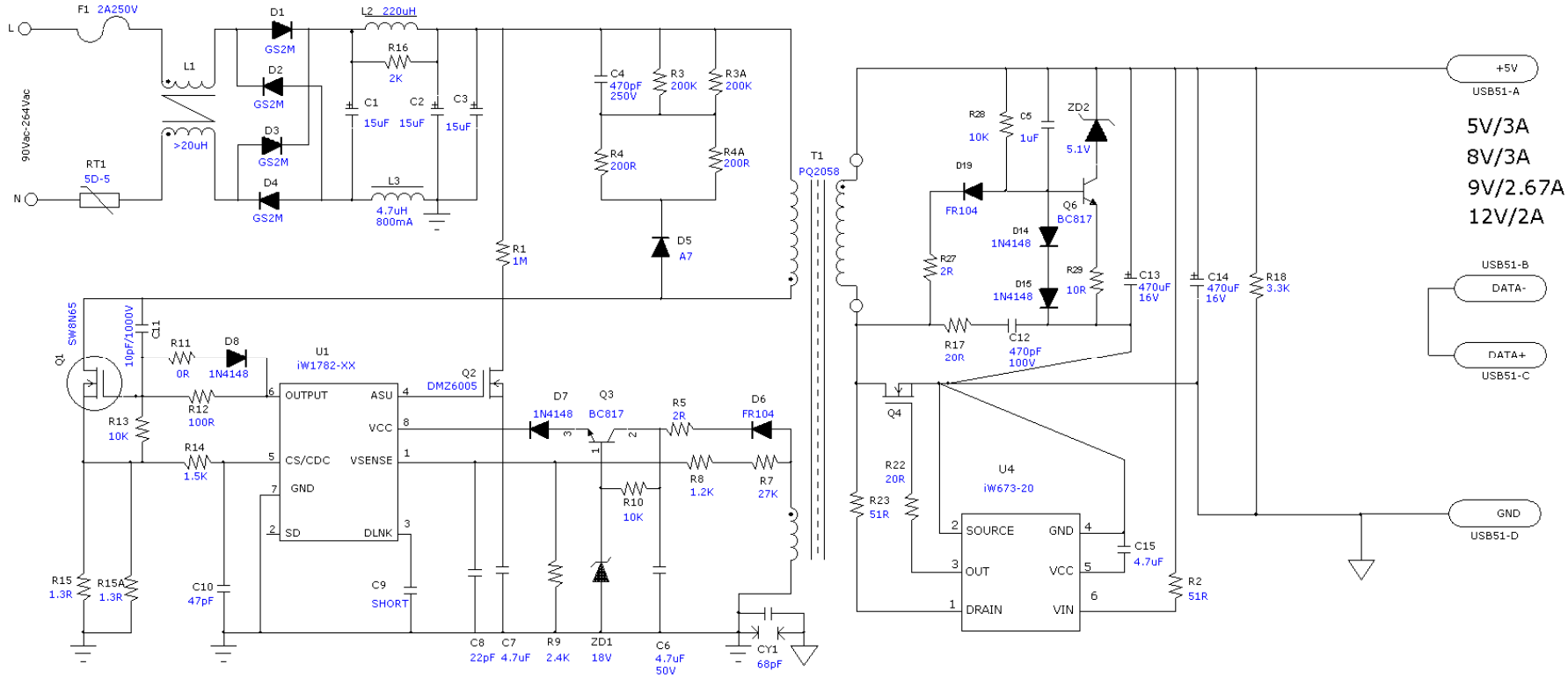
注意：不可以删除任何元件



4. 单PE+方案电路图(low cost方案）

此个方案只能满足单个PE+方案（兼容2.0和1.1）

我们已经推出18W/24W（5V9V2A12V1.5A, 5V8V3A12V2A）



Part Number	Options			Rated Max Current	Rated Max Power	CC/CP Corner	Package	Description
	Protocol Supported	Default k_{CC} at Start-up	CC Shutdown Voltage at 5V Output[1]					
iW1780H-22	PE+1.1/ PE+2.0	0.422	3V	3A	24W	8V	SOIC-8	Tape & Reel[2]

Disclaimer

Disclaimer

Information in this document is believed to be accurate and reliable. However, Dialog Semiconductor does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information. Dialog Semiconductor furthermore takes no responsibility whatsoever for the content in this document if provided by any information source outside of Dialog Semiconductor.

Dialog Semiconductor reserves the right to change without notice the information published in this document, including without limitation the specification and the design of the related semiconductor products, software and applications.

Applications, software, and semiconductor products described in this document are for illustrative purposes only. Dialog Semiconductor makes no representation or warranty that such applications, software and semiconductor products will be suitable for the specified use without further testing or modification. Unless otherwise agreed in writing, such testing or modification is the sole responsibility of the customer and Dialog Semiconductor excludes all liability in this respect.

Customer notes that nothing in this document may be construed as a license for customer to use the Dialog Semiconductor products, software and applications referred to in
this document. Such license must be separately sought by customer with Dialog Semiconductor.

All use of Dialog Semiconductor products, software and applications referred to in this document are subject to Dialog Semiconductor's, Standard Terms and Conditions of Sale, unless otherwise stated.

Evaluation Boards

In addition to the above "Disclaimer," Dialog Semiconductor provides this evaluation board under the following conditions:
This evaluation board is provided for evaluation purposes only and is not intended for commercial use in any end product. Dialog Semiconductor expressly disclaims all warranties, express, implied or statutory, including (but not limited to) the implied warranties of non-infringement, suitability for a specific application(s) or end product(s), product quality or reliability. All risks and liability regarding quality, use or performance of this evaluation board are those of the customer/user and/or customer/user's employer.

This evaluation board must be used in a test area/laboratory specifically designed and designated for working with, and evaluating high-voltage electrical devices. Only trained and qualified professional personnel with experience, knowledge and training in the use of high-voltage electrical circuits should use this evaluation board. Trained personnel must use required personal protective equipment and required laboratory equipment when working with the evaluation board.

The user, and/or user's employer, if user is using this evaluation board for employer-related purposes:

- Assumes all responsibility and liability for proper and safe handling of the evaluation boards and indemnifies Dialog Semiconductor from any and all claims arising from use of the evaluation board.
- Assumes all responsibility for using this evaluation board in a test area or laboratory which is qualified and/or certified according to the local regulations, guidelines and labor laws applicable to working with non-isolated mains voltages and high voltage circuits
- Understands that this evaluation board has not been agency tested or approved for safety, technical performance, and/or regulatory requirements, by any agency. This includes electromagnetic interference or other technical regulatory or safety testing and certifications.

The power to be...

...personal
...portable
...connected