USB Type-C and USB Type-A Dual-Port Controller

Hynetek Semiconductor Co., Ltd.

HUSB365

FEATURES

- USB Type-C 2.1 and USB PD3.1 Compliant
  - Support 5 V, 9 V, 12 V, 15 V and 20 V five FPDOs
  - Support 2 Programmable APDOs available
- Support BC1.2 DCP and HVDCP protocols
  - BC 1.2 DCP Mode
  - Apple 5V 2.4A Mode
  - QC2.0/3.0/QC3.0+ Class A or Class B
  - Samsung AFC
  - FCP and LVSCP/HVSCP
  - PE 1.1+
- Support USB Type-A and Type-C Dual-Port Working Mode
- Support Chip-Link
- Support as low as 5 mA Lightload threshold
- External N-MOSFET Supported
- Support Constant Voltage Loop(CV) and Constant Current Loop(CC) Operation
- Support Line Loss Compensation
- Integrated VIN and VBUS Fast Discharge
- Integrated OVP, UVP, UVLO, OCP, FOCP, CC/DPDM OVP, TSD and NTC Protections
- Support Online Upgrade
- QFN-24L (4 mm x 4 mm) Package
- ±4 kV HBM ESD Rating for USB IO Pins

APPLICATIONS

Adaptor

Power Bank

Car Charger

GENERAL DESCRIPTION

The HUSB365 is a high performance, high integration USB Type-C and USB Type-A Dual-Port controller. When any one of them works alone, it supports fast charging and goes back to 5 V when they work together. Especially the HUSB365 can automatically identify whether the port device is a cable for a better fast charging experience.

The HUSB365 integrates Chip-Link technology which can through a single PIN (FC-PIN) to achieve Chip Communication for more applications such as Dual USB Type-C and Dual USB Type-A.

The HUSB365 integrats PD3.1 controller which supporting 5 FPDOs and 2 APDOs. The 5 FPDOs support programmable current and 2 APDOs support programmable voltage and current for different applications. All of PDOs are fully compliant with PD3.1 Rev.1.3 spec. Besides, the HUSB365 also supports BC1.2 DCP, Apple 2.4A, QC2.0/3.0/QC3+, AFC, FCP and SCP, PE1.1+ protocols.

The HUSB365 integrates all of required protections such as Over Voltage Protection (OVP), Under Voltage Protection (UVP), Under Voltage Lock Out (UVLO), Over Current Protection (OCP), Fast Over Current Protection (FOCP), CC or DPDM Over Voltage Protection (Port OVP) and Thermal Shut Down (TSD).

It is available in 4 mm x 4 mm, QFN-24L package.

TYPICAL APPLICATION CIRCUIT

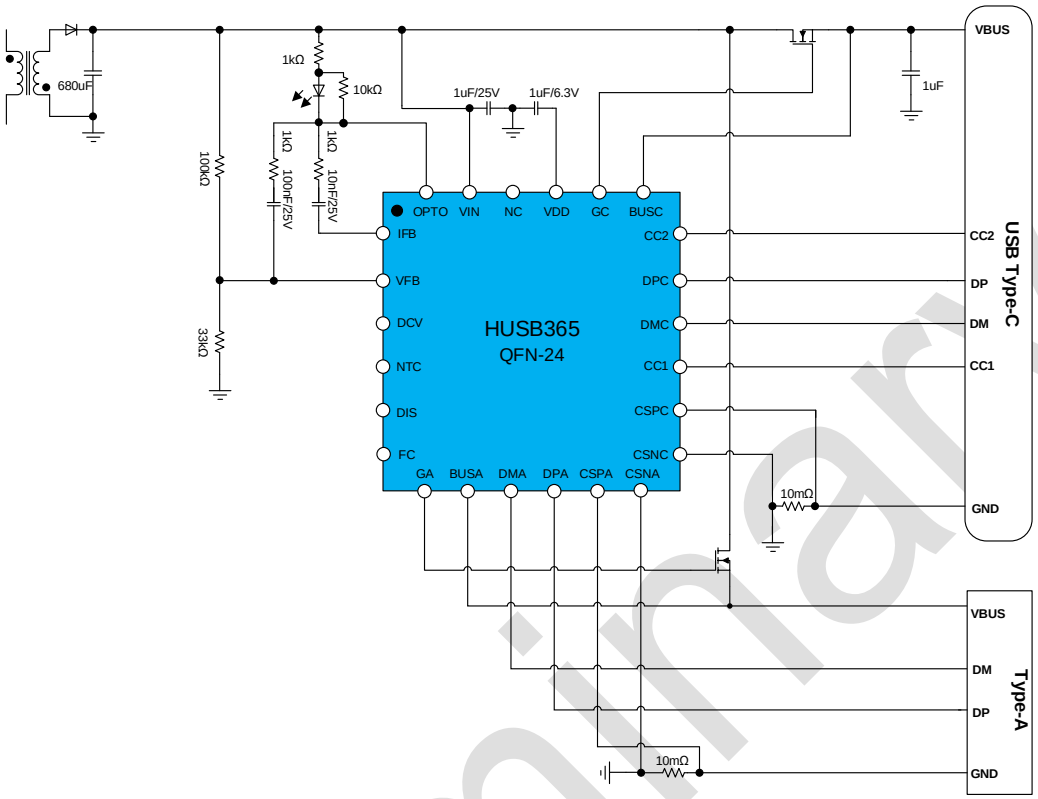


Figure 1. Typical Application Circuit for OPTO Feedback

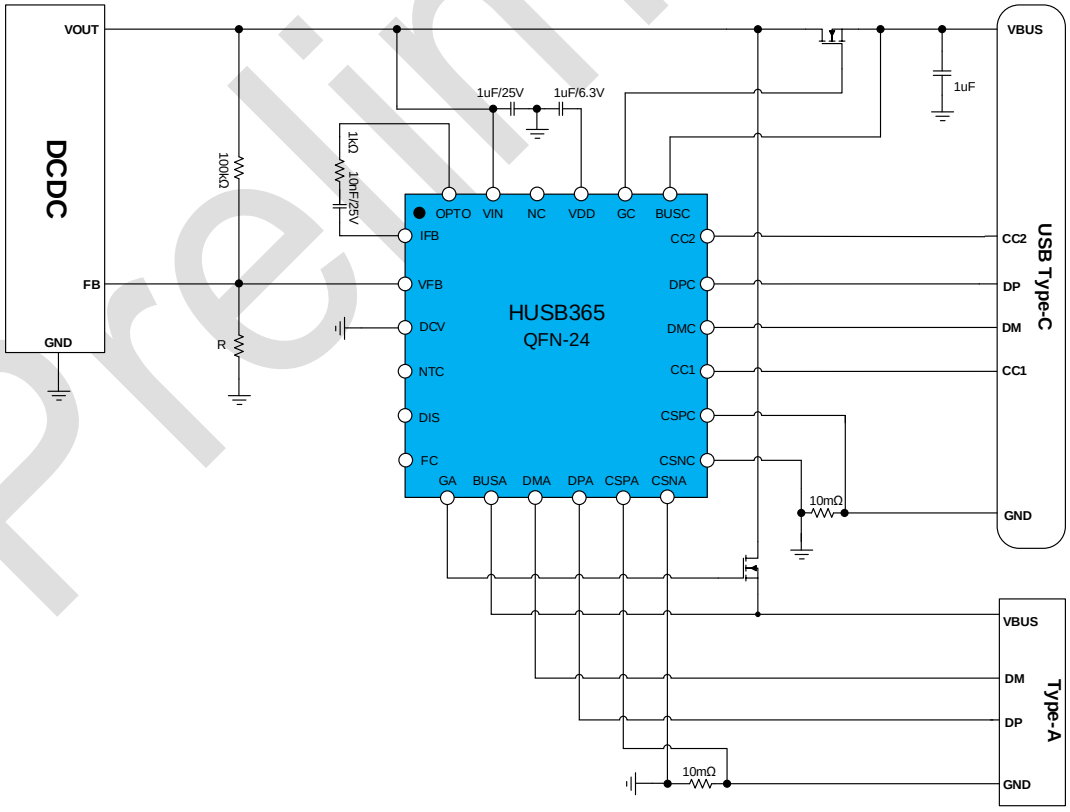


Figure 2. Typical Application Circuit for FB Feedback

TABLE OF CONTENTS

REVISION HISTORY

Version	Date	Descriptions
Rev. 0.0	01/2023	Initial version
Rev. 0.5	02/2023	Add Recommended Operating Conditions to Tape and Reel Information content
Rev.0.6	03/2023	Update Ordering Guide

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

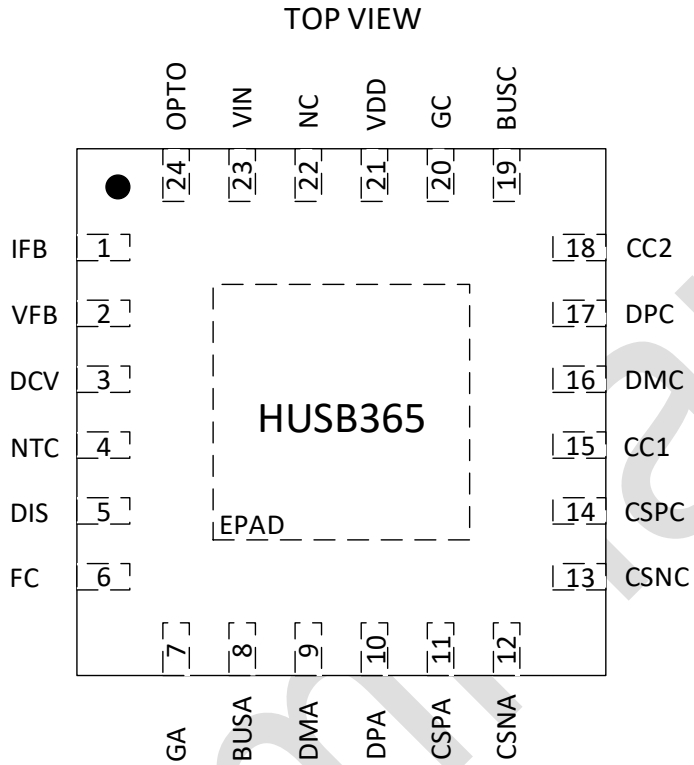


Figure 3. Pin Assignment

Table 1. Pin Function Descriptions

Pin No.	Pin Name	Type1	Description
1	IFB	AI	Feedback point of Constant Current (CC) loop, connect CC compensation network to this pin.
2	VFB	AIO	Feedback point of Constant Voltage (CV) loop, connect CV compensation network to this pin.
3	DCV	AI	It is used to choice the HUS365 application mode. FOR ACDC application this pin must floating and for DCDC application it must tie to GND.
4	NTC	AIO	An external negative temperature coefficient resistor connected to this pin for remote temperature sensing.
5	DIS	AO	It is used to provide an external discharge path for VIN through control an external N-MOSFET.
6	FC	AIO	Chip-Link function.
7	GA	AO	External N-MOSFET gate driver output of USB Type-A connector.
8	BUSA	AIO	Insert detection point of USB type A connector.
9	DMA	DIO	DM line of USB Type-A connector.
10	DPA	DIO	DP line of USB Type-A connector.
11	CSPA	AI	Positive current sensing input of USB Type-A connector.
12	CSNA	AI	Negative current sensing input of USB Type-A connector.
13	CSNC	AI	Negative current sensing input of USB Type-C connector.
14	CSPC	AI	Positive current sensing input of USB Type-C connector.

Pin No.	Pin Name	Type1	Description
15	CC1	AIO	CC1 line of USB Type-C connector.
16	DMC	DIO	DM line of USB Type-C connector.
17	DPC	DIO	DP line of USB Type-C connector.
18	CC2	AIO	CC2 line of USB Type-C connector.
19	BUSC	AI	VBUS detection point of USB Type-C connector.
20	GC	AO	External N-MOSFET gate driver output of USB Type-C connector.
21	VDD	P	Output of internal LDO. Connect this pin to GND via a recommended 1uF ceramic capacitor.
22	NC		
23	VIN	P	Input power pin. Connect this pin to GND via a recommended 1uF ceramic capacitor.
24	OPTO	AI	Connection of Opto-coupler feedback.
-	EPAD	P	Ground plane.

Legend:
A = Analog Pin
P = Power Pin
D = Digital Pin
I = Input Pin
O = Output Pin

RECOMMENDED OPERATING CONDITIONS

Table 2.

Parameter	Rating
VIN Input Voltage	3 V to 22 V
Operating Temperature Range (Junction) Ambient Temperature Range	−40°C to 125°C −40°C to 85°C

SPECIFICATIONS

V_{in} = 5 V, T_A = 25°C for typical specifications, unless otherwise noted.

Table 3.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
Power Supply						
Supply Voltage	V_{IN}	CC1,CC2 are Floating and in Sleep Mode	3		22	V
Supply Voltage UVLO Threshold	V_{IN_UVLO}	Rising edge		3.4		V
Supply Voltage UVLO Hysteresis	$V_{IN\_UVLO\_HYS}$			0.4		V
Supply Current	I_{CC}	CC is attached and in Standby Mode, VIN=5 V		5		mA
Quiescent Current	I_Q	CC1,CC2 are Floating and in Sleep Mode,VIN=5 V		800		uA
VDD Voltage	V_{DD}			4.8		V
Type-C						
1.5 A Mode Pull-Up Current Source	$I_{RP\_1.5A}$		166	180	194	uA
3.0 A Mode Pull-Up Current Source	I_{RP_3A}		304	330	356	uA
UFP Detection Threshold at 1.5A Current	$vR_{d\_OPEN\_1.5A}$	180 uA Rp current source is enabled	1.55	1.6		V
UFP Detection Threshold at 3.0A Current	$vR_{d\_OPEN\_3A}$	330 uA Rp current source is enabled	2.55	2.6		V
BMC Rx PARAMETERS						
Receiver Input Impedance	zBmcRx	Input impedance of Rx	5			MΩ
Rx Low Pass Filter Constant	tRxFilter	Time constant of a single pole filter	100			ns
BMC COMMON PARAMETERS						
Bit Rate	fBitRate		270	300	330	kbps
BMC Tx Parameters						
Falling Time	t_{Fall}	10 % and 90 % amplitude points, unloaded condition and RCC=0 Ohm, cCC=0 pF	300			
Rise Time	t_{Rise}	10 % and 90 % amplitude points, unloaded condition and RCC=0 Ohm, cCC=0 pF	300			
Voltage Swing	V_{Swing}	CC pull down resistor >800 Ω	1.05	1.125	1.2	V
Voltage low	V_{Low}	CC pull down resistor >800 Ω	-75	0	75	mV
Transmitter output impedance	zDriver	Tx output impedance at 750 kHz with CC attached	30		75	Ω
BC1.2 DCP Mode						
DP and DM shorting resistance	R_{DPM_SHORT}	VDP=0.6 V		20	40	Ω
DP Leakage Resistance	R_{DP_LKG}	VDP=0.6 V	0.6	0.8	1.5	MΩ
APPLE 2.4 A Mode						
DP Output Voltage	$V_{DP\_2.7V}$	VIN=5 V		2.7		V
DM Output Voltage	$V_{DM\_2.7V}$	VIN=5 V		2.7		V
HVDCP Mode						
Data Detect Voltage	V_{DAT_REF}			0.325		V
Output voltage selection reference	V_{SEL_REF}			2		V
DP High Glitch Filter Time	$T_{GLITCH\_BC\_DONE}$		1	1.25	1.5	s
DM Low Glitch Filter Time	$T_{GLITCH\_DM\_LOW}$		1	2		ms

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
Output Voltage Glitch Filter Time	$T_{GLITCH\_V\_CHANGE}$		20	40	60	ms
DM Pull-Down Resistance	R_{DM_DWM}			15		KΩ
QC MODE						
Pulse Glitch Filter Time	$T_{GLITCH\_CONT\_CHANGE}$	For QC3.0 in continues mode	100		200	us
FCP MODE						
DM FCP Tx Valid Output High	V_{TX_VOH}	In AFC or FCP/SCP mode, same conditions applied to the following items	2.55		3.6	
DM FCP Tx Valid Output Low	V_{TX_VOL}				0.3	V
DM FCP Rx Valid Input High	V_{RX_VIH}		1.3		3.6	V
DM FCP Rx Valid Input Low	V_{RX_VIL}				1	V
DM Output Pull-Low Resistance	R_{DPL}				1	KΩ
DM Output Pull-High Resistance	R_{DPH}				1	KΩ
Unit Interval For FCP	UI		144		180	us
Voltage Control						
VIN Step LSB				20		mV
VDAC Resolution				10		Bit
Default Voltage	VIN_DEF			5.05		V
VIN Regulation Accuracy	vSRCValid	Ta=25℃	97		103	%
Current Control						
Sensing Resistor	RCS			10		mΩ
Over Voltage Protection						
Over-voltage Protection Threshold	V_{OVP_TH}	request max voltage is 5 V		6.2		V
		request max voltage is 5.9 V		7.2		V
		request max voltage is 7 V		8.2		V
		request max voltage is 9 V		10.5		V
		request max voltage is 12 V		13.8		V
		request max voltage is 16 V		18		V
		request max voltage is 21 V		23.5		V
OVP De-bounce Time	t_{OVP_DEB}			15		us
Port Over Voltage Protection						
CC , DP , DM OVP threshold	$V_{PORT\_OV\_TH}$			5.5		V
Port OVP De-bounce Time	$t_{PORT\_OV\_DEB}$			2		ms
Over Current Protection						
OCP Protection Threshold	I_{IN_OC}	Reference to internal IIN reference.eg 3 A		3.3		~~A~~
OCP De-bounce Time	t_{OCP_DEB}			20		ms
FOCP Protection Threshold	I_{IN_FOCP}			18		A
FOCP De-bounce Time	t_{FOCP_DEB}			15		us
Light load DET						
Light load Threshold	I_{ILL}			5		mA
Light load De-bounce	t_{LL_DEB}			7		S
NTC Protection						
NTC Protection Threshold	V_{NTC_TH}	Rising		0.72		V
		Falling		0.6		V
NTC Hysteresis				0.12		V
Thermal Shut Down						
TSD Threshold	T_{TSD}			135		°C
TSD Hysteresis	T_{TSD_HYS}			30		°C

ABSOLUTE MAXIMUM RATINGS

Table 4.

Parameter	Rating
VIN,BUSA,BUSC,GC,GA,OPTO to GND	−0.3 V to 26 V
CC1,CC2,DPC,DMC,DPA,DMA to GND	-0.3 V to 26 V
IFB,VFB,CSNA,CSPA,CSNC,CSPC,VDD,NTC,FC,DCV,DIS to GND	-0.3 V to 6 V
Operating Temperature Range (Junction)	−40°C to 125°C
Soldering Conditions	JEDEC J-STD-020
Electrostatic Discharge (ESD)	
Human Body Model	±4000 V

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

THERMAL RESISTANCE

Thermal performance is directly linked to printed circuit board (PCB) design and operating environment. Close attention to PCB thermal design is required.

θ_{JA} is the natural convection junction to ambient thermal resistance measured in a one cubic foot sealed enclosure.

θ_{JC} is the junction to case thermal resistance.

Table 5. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}	Unit
4 mm*4 mm QFN-24L	52	23	°C/W

ESD CAUTION

Electrostatic Discharge Sensitive Device.

Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

THEORY OF OPERATION

VIN PIN

VIN pin is the power supply input, which is derived from the output of the AC-DC or DC-DC converter. Connect a 1 μF decoupling MLCC between VIN pin and GND pin.

The VIN pin is also connected to an internal MOSFET and discharge resistor, which is used as a bleeder to help discharge the energy stored in the output capacitor. With this bleeder, VIN can be regulated to vSafe5V upon the detachment of a connected device, or to a lower desired output voltage level upon a request command received from the Sink, such as from 20 V to 5 V.

VDD PIN

An internal liner regulator is used to provide 4.8 V for internal circuits. Connect a 1 μF MLCC to VDD pin for decoupling.

CONTROL LOOP CIRCUIT (VFB, CS+, CS−, IFB, OPTO PINS)

The HUSB365 Integrated the constant voltage loop (CV loop) and constant current loop (CC loop). It is uses a direct feedback voltage control method to adjust the VIN voltage, that is the output voltage of the front end power stage. The VFB pin of the HUSB365 is connected to the feedback node of the front end power stage as shown in *Figure 4 for OPTO feedback*. The front end power stage can be a AC-DC or a DC-DC regulator. The HUSB365 sources or sinks a current to adjust the VIN voltage depending on the request from sink by . The current output DAC on FB pin has a LSB of 0.2 μA. When the top resistor of the feedback network of the front end power stage is set to 100 kΩ, the VBUS voltage changes 20 mV per step.

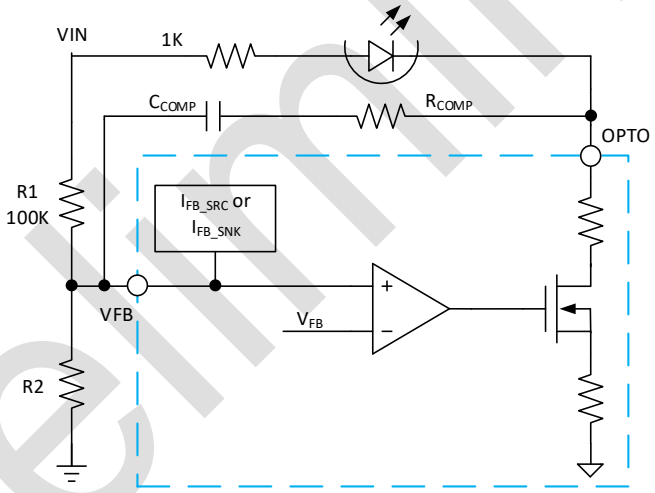


Figure 4 CV loop control circul for opto feedback

In order to guarantee the valid VIN range, the feedback resistor network of the front end power stage should be set to output 5 V on VIN, where no source nor sink current is flowing on VFB pin of the HUSB365 (I_{FB_SRC} = I_{FB_SNK} = 0 A). Follow the equation below to choose the R2 value:

$$R2 = \frac{V_{FB} \times \mathrm{R1}}{\mathrm{VIN} - V_{FB}}$$

where, V_{FB} is the feedback node voltage of the front end power stage or the HUSB365 internal for FB feedback application or OPTO feedback application.
For example, if V_{FB} = 1.24 V, R1 = 100 kΩ, VIN = 5 V, then R2 is calculated as 33 kΩ. It is recommended to choose resistors with 1% accuracy for both R1 and R2 values.

IR COMPENSATION

IR compensation is available for all protects except PPS. If PPS is available in any power level, IR compensation will be disabled. There are 4 IR compensation options, 0 mV/A, 60 mV/A, 120 mV/A and 180 mV/A. The default IR compensation is 0 mV/A.

For example, if 60 mV/A IR compensation is selected, then for the 5 V/3 A condition (except APDO), the actual VIN voltage is:

$$5\ V + 3\ A \times 60\ mV/A = 5.18\ V$$

CURRENT SENSE RESISTOR

The recommended current sense resistor is 10 mΩ. The sensed current information is employed to perform OCP, FOCP and Constant Current Control.

CC1 AND CC2 PINS

CC1 and CC2 pins are used to detect Type-C connection, BMC communication.

TYPE-C CC FUNCTION

CC1 and CC2 are the Configuration Channel pins used for connection and attachment detection, plug orientation determination and system configuration management across USB Type-C cable.

The HUSB365 monitors the status of CC1 and CC2 pins and decide which state the HUSB365 should enter.

CC1 and CC2 are configured as Source only mode with 1.5 A and 3 A current advertising. The default R_p current on CC1 and CC2 is I_{CC_3P0}, which means 3 A current advertising.

The CC1 and CC2 can tolerance a voltage up to 28 V. This is helpful for the HUSB365 to survive in the failure when the CC1 or CC2 is shorted to the VBUS pin.

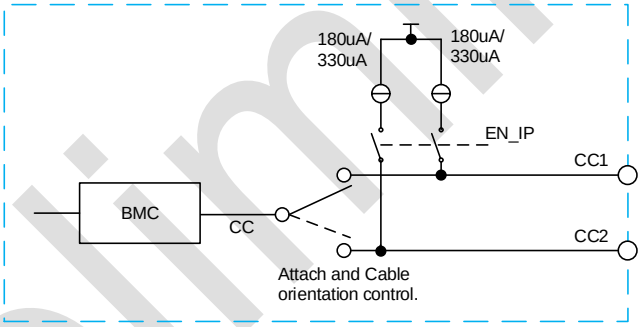


Figure 5. CCx Hardware Diagram

BMC DRIVER

Through the Type-C detection, one of the CC pins will be connected to the internal BMC block to achieve PD communication.

VBUSC PIN

This pin is used to sense VBUSC presence and discharge VBUS voltage on USB Type-C receptacle side.

VSAFE0V DETECTION

When the HUSB365 is attached with a Sink, it detects whether the VBUSC voltage is within vSafe0V. If yes, the HUSB365 enters Attached.SRC state. If no, it will stay at AttachWait.SRC state.

VBUSC DISCHARGE

The VBUS pin is also connected to an internal MOSFET and discharging circuitry, which is used as a bleeder to help dissipate the energy stored in the VBUS capacitor. With this bleeder, VBUS is discharged to vSafe0V upon the detachment of a connected device, or to a lower desired output voltage level upon a request command received from the Sink, such as from 20 V to 5 V.

VBUSA PIN

This pin is used to detecting device insert on USB Type-A receptacle side. When the device detached at least 7 seconds, It's will be weak pulled-up to 3.5 V, the capacitance connected VBUSA PIN to GND is not allowed.

DIS PIN

This pin is used to provide an external discharging path for VIN through driver a external N- MOSFET as show as *Figure 6.* When not used it can be floating.

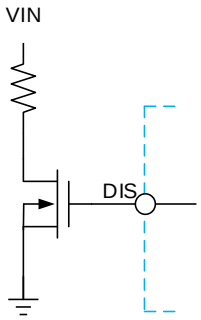


Figure 6 External discharge application

FC PIN

This pin is used to communiction between two chips if Chip-Link function enable.

CHIP-LINK FUNCTION

When the Chip-Link function is enable, connected the FC pin together between two HUSB365. The HUSB365 can detected whether the another HUSB365 is working through communication on this pin and decide whether advertising high power. For example, when only one HUSB365 working, it's advertised 65 W and advertised 30W when the both HUSB365 working. For detail application see the typical application circuits chapter.

NTC PIN

The HUSB365 uses the NTC pin to sense the external temperature with higher accuracy. As show in *Figure 7* , There is an internal current source 20 uA at the NTC pin. With an external Rp and series a NTC resistor from NTC pin to ground, The HUSB365 can detect the voltage across this NTC resistor and calculate the temperature per the T-R characteristics.

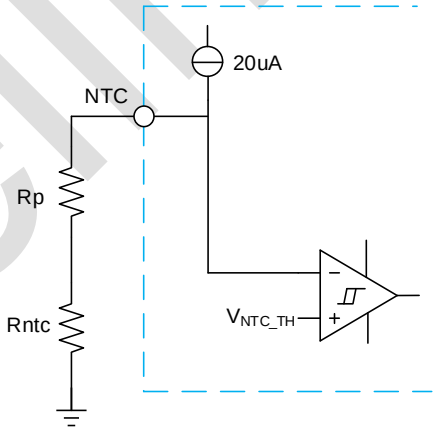


Figure 7 NTC application example

OVER VOLTAGE PROTECTION

The HUSB365 detects the VIN pin voltage to achieve over-voltage protection function. The threshold to trigger over-voltage protection is based on request max voltage as show in *Table 6*. When the over-voltage condition occurs, the HUSB365 turns off the external load switch. When the over-voltage condition is removed, the HUSB365 is reset to default mode and will automatic recover again.

Table 6.

Request max voltage	Over Voltage Protection threshold
5 V	6.2 V
5.9 V	7.2 V
7 V	8.2 V
9 V	10.5 V
12 V	13.8 V
16 V	18 V
21 V	23.5 V

OVER CURRENT PROTECTION

When the current sensed by the sense resistor exceeds the 110% of IIN_REF, the over-current protection takes action and turns off the external load switch. When the over-current condition is removed, the HUSB365 is reset to default mode and will automatic recover again.

FAST OVER CURRENT PROTECTION

The HUSB365 integrates FOCP protection function. When the VBUSA or VBUSC is hard shorted to GND by fault, the output current increases sharply. When the output current reaches the FOCP threshold, the protections circuit takes action and turns off the external load switch. When the short condition is removed, the HUSB365 is reset to default mode and will automatic recover again.

THERMAL SHUT DOWN

When the junction temperature rises across T_{TSD}, thermal shut down takes action and turns off the external load switch. When the junction temperature falls across T_{TSD}-T_{TSD_HYS}, the HUSB365 is reset to default mode and will automatic recover again.

CHARGING PROTOCOLS AUTO SELECTION (DP AND DM PIN)

The HUSB365 supports various fast charging protocols including BC1.2 DCP, APPLE 2.4A, QC 2.0/3.0 Class A, AFC, FCP and SCP. According to the different status of DP and DM pins, the HUSB365 recognizes the attached Sinks and apply the fast charging protocol automatically.

DPDM_APP MODE

The DPDM_APP mode is the mode that the HUSB365 supports the Apple 2.4A charging protocol. In the DPDM_APP mode, the HUSB365 outputs 2.7 V DC voltage on both DP and DM pins. The 2.7 V can be pulled down by the attached Sink. If DP or DM pin is pulled down below V_{SEL_REF}, the HUSB365 exits the DPDM_APP mode and enters into DPDM_DCP mode.

DPDM_DCP MODE

The DPDM_DCP mode is the mode that the HUSB365 supports BC1.2 DCP protocol. The 2.7 V DC sources are removed and the DP and DM pins are shorted through R_{DPM_SHORT} resistor. It is possible for the attached Sink to start primary, secondary and HVDCP detection processes when the HUSB365 is in DPDM_DCP mode.

DPDM_HVDCP MODE

After successful detection of the DCP, the HUSB365 notify the Sink that the HUSB365 enters into HVDCP mode. In the HVDCP mode, the HUSB365 monitors the DP and DM pin status and enters into different modes depending on the status of DP and DM pins.

POWER CONFIGURATIONS

The HUSB365's 5 FPDOs support programmable current and 2 APDOs support programmable voltage and current for different applications. For HUSB365-AA100-QN24R, the default power configuration is 20 W as shown in *Table 7*.

Table 7. HUSB365_AA000_QFN24R Power Configurations

Power Parameters	Note
FPDO1	5 V 2 A
FPDO2	9 V 2.22 A
FPDO3	12 V 1.67 A
FPDO4	NA
FPDO5	NA
APDO1	3.3 V-5.9 V/3 A
APDO2	3.3 V-11 V/1.8 A
IR Comp	60 mV/A
OCP Rating	110%
DPDM Modes	Apple 2.4A, BC1.2 DCP, QC2.0/3.0/3.0+, PE1.1+, AFC, FCP and SCP(10 V/2 A)

TYPICAL APPLICATION CIRCUITS

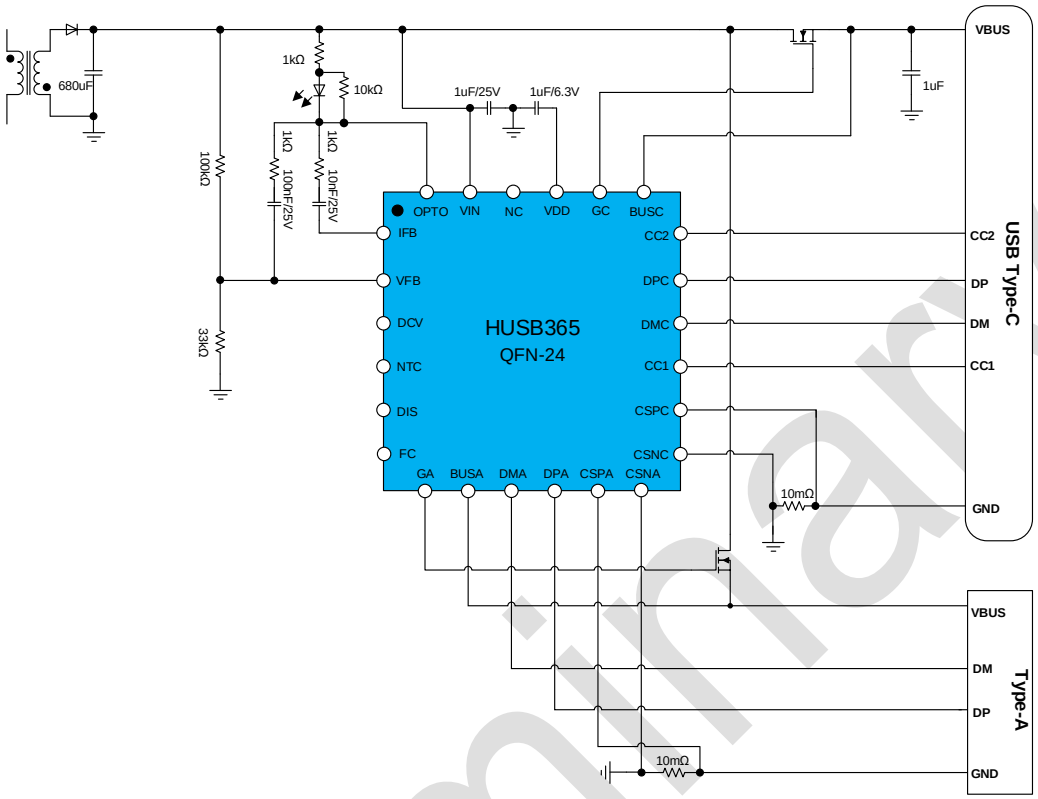


Figure 8. Typical Application Circuit for OPTO Feedback

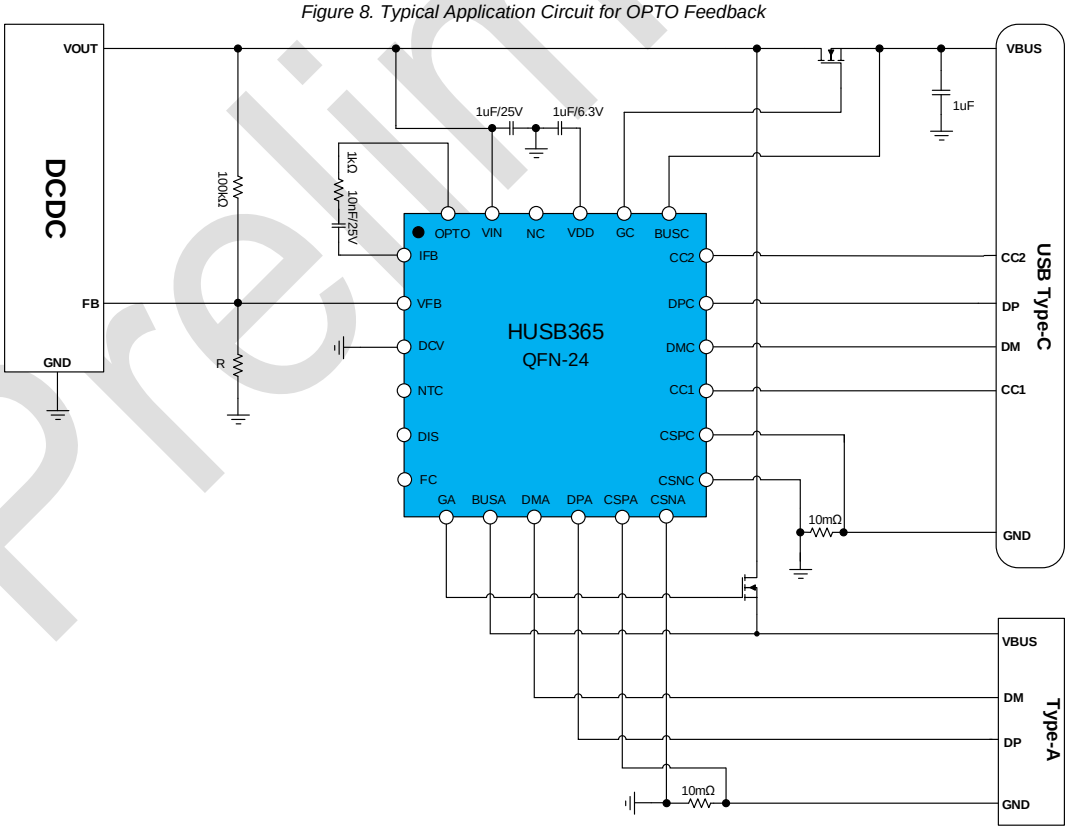


Figure 9. Typical Application Circuit for FB Feedback

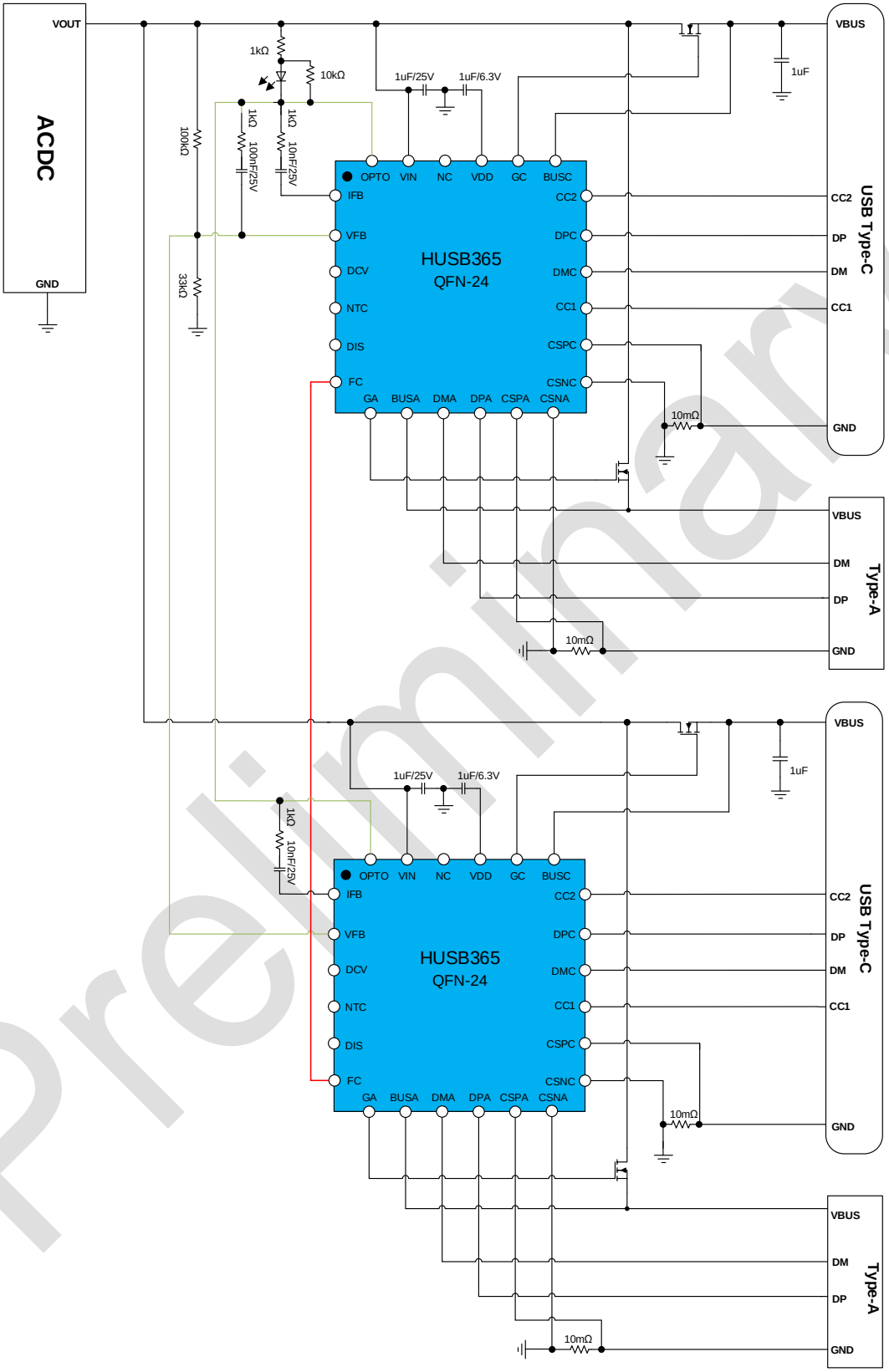


Figure 10. Chip-Link Typical Application Circuit for Share power

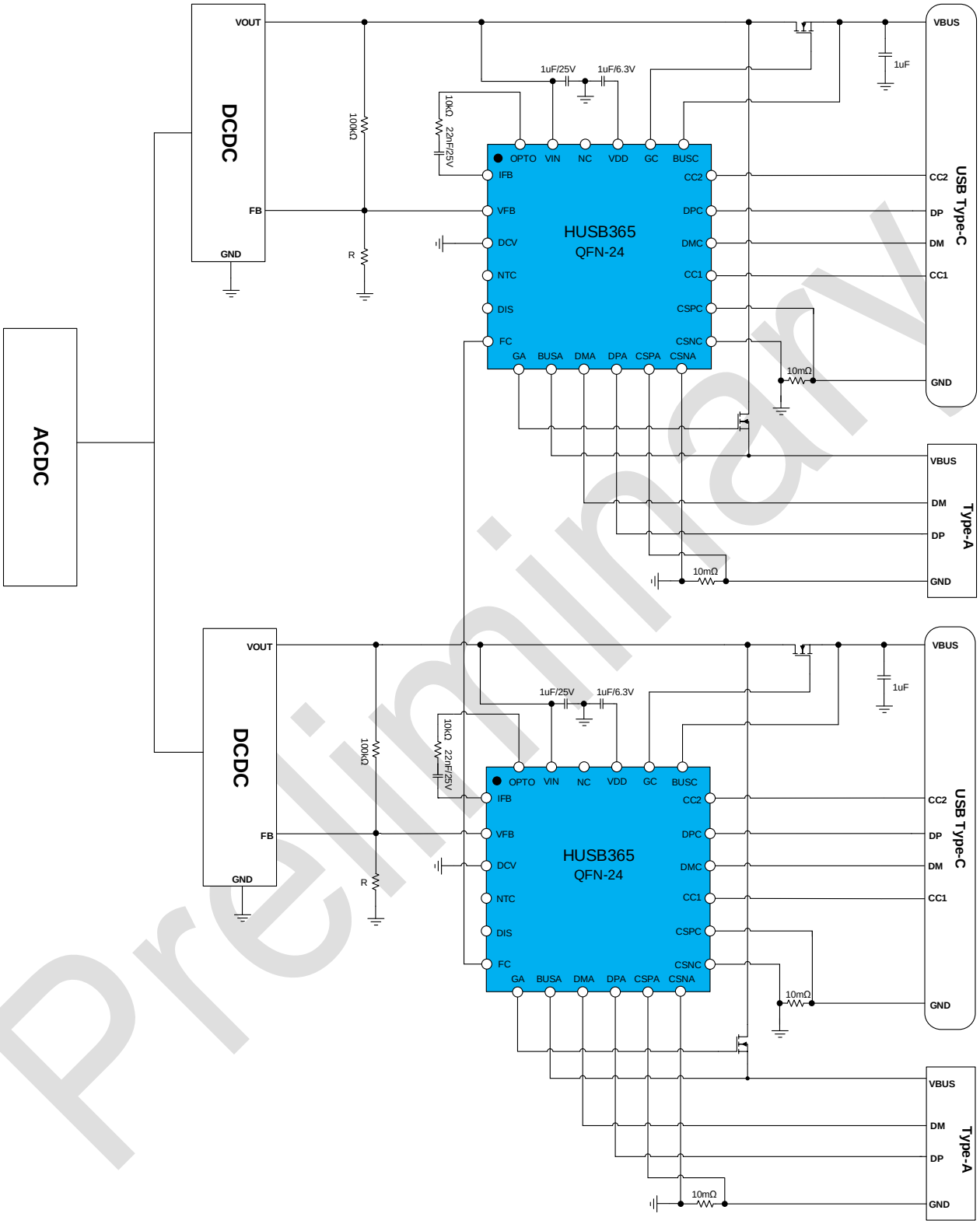
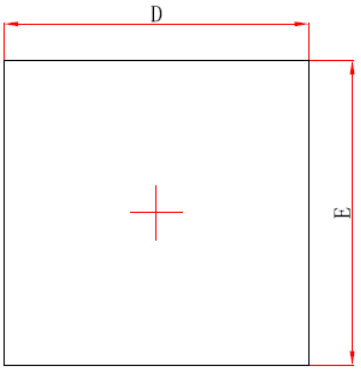
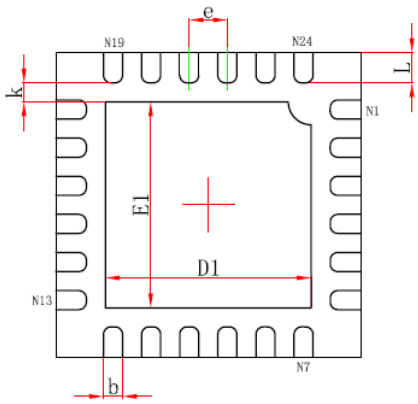


Figure 11. Chip-Link Typical Application Circuit for Independent power

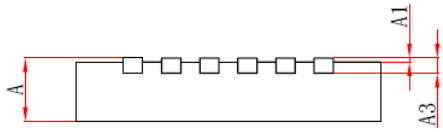
PACKAGE OUTLINE DIMENSIONS



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	3.924	4.076	0.154	0.160
E	3.924	4.076	0.154	0.160
D1	2.600	2.800	0.102	0.110
E1	2.600	2.800	0.102	0.110
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.324	0.476	0.013	0.019

Figure 12. Package Outline

ADVANCE INFORMATION

PACKAGE TOP MARKING

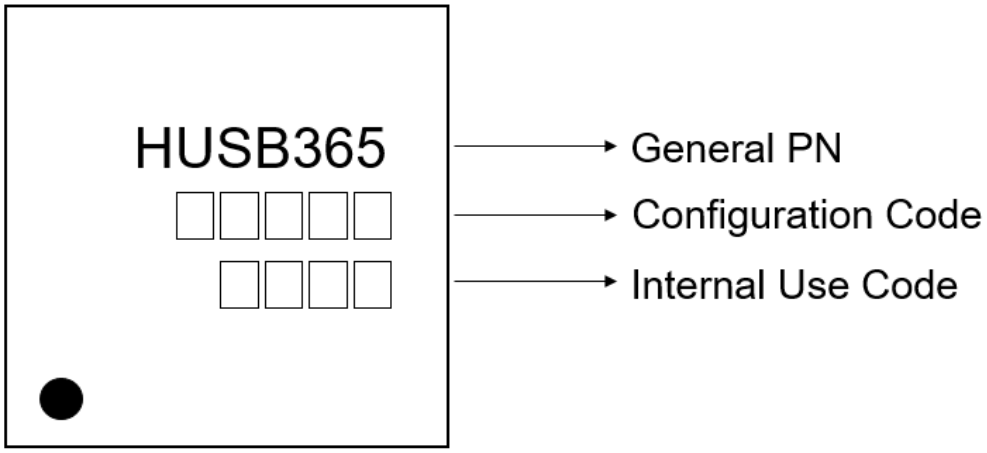


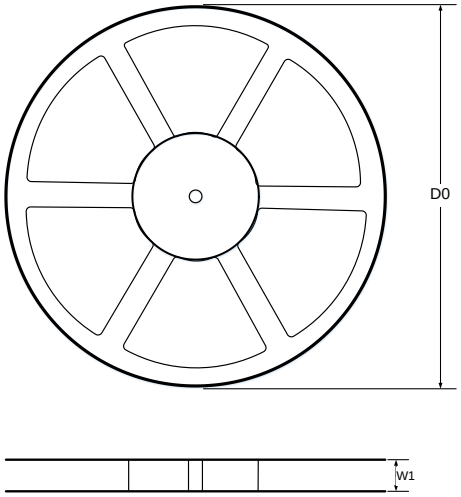
Figure 13. Figure Cap

ORDERING GUIDE

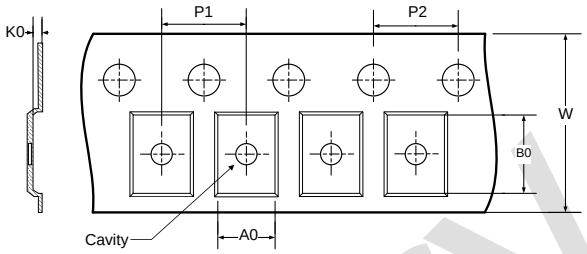
Model	Power Configurations	T_J Temp (°C)	Package Type	Package Option	Package Qty
HUSB365-AA100-QN24R	Refer to *Table 7*	-40 to 125	QFN 24L, 4 mmX4 mm	Tape & Reel	5000
HUSB365-AAXXX-QN24R	Customizable, Contact Hynetek	-40 to 125	QFN 24L, 4 mmX4 mm	Tape & Reel	5000

TAPE AND REEL INFORMATION

REEL DIMENSIONS

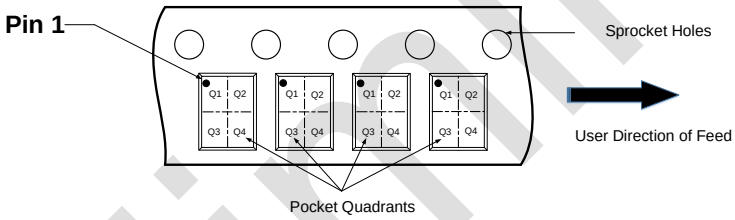


TAPE DIMENSIONS



A0：Dimension designed to accommodate the component width
B0：Dimension designed to accommodate the component length
K0：Dimension designed to accommodate the component thickness
W： Overall width of the carrier tape
P1：Pitch between successive cavity centers
P2：Pitch between sprocket hole
D0：Reel Diameter
W1：Reel Width

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



DIMENSIONS AND PIN1 ORIENTATION

D0 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant	Quantity
330.00	12.40	4.30	4.30	1.10	8.00	4.00	12.00	Q1	5000

All dimensions are nominal

Figure 14. Figure Cap

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