



达林顿光耦

Darlington Optocoupler

QX215

宁波群芯微电子股份有限公司

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QX215

Darlington Optocoupler

概述 Description

QX215 是一款由发光二极管和达林顿晶体管组成的光电耦合器。四引脚封装（SSOP4）。

The QX215 is a photoelectric coupler composed of light-emitting diode and darlington transistor. It is packaged in a 4-pin SSOP package.

特性 Features

- 电流转换比(CTR)范围: 600%~7500% ($I_F=1\text{mA}$, $V_{CE}=2\text{V}$, $T_a=25^\circ\text{C}$)
Current transfer ratio: 600%~7500% ($I_F=1\text{mA}$, $V_{CE}=2\text{V}$, $T_a=25^\circ\text{C}$)
- 输入-输出隔离电压 ($V_{ISO}=3750\text{ Vrms}$)
High isolation voltage between input and output($V_{ISO}=3750\text{ Vrms}$)
- 爬电距离 $\geq 5\text{mm}$
Creepage distance $\geq 5\text{mm}$
- 外部电气间隙 $\geq 5\text{mm}$
External electrical clearance $\geq 5\text{mm}$
- $\text{DIT} \geq 0.4\text{mm}$

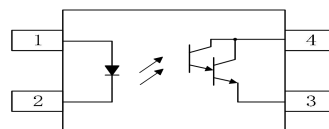
应用 Applications

- 开关电源, 智能电表
Switching power supply, intelligent meter
- 工业控制, 测量仪器
Industrial control, measuring instruments
- 办公设备, 比如复印机
Office equipment such as copiers
- 家用电器, 比如空调、风扇、热水器等
Household appliances: such as air conditioners, fans, water heaters, etc.

封装和原理图 Package and Schematic Diagram



SSOP4



Pin Configuration

1. Anode
2. Cathode
3. Emitter
4. Collector

产品型号命名规则 Order Code

QX 215 - UN Y - W V (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦

- ① 公司代码 Company Code (QX: 群芯 Qunxin)
② 产品系列 Product Series (215)
③ 框架类型 Lead Frame (Cu: 铜框架 Copper)
④ 树脂类型 Epoxy (H: 无卤 Halogen-free)
⑤ 封装形式 Package (S:SSOP4)
⑥ 器件工作温度范围 Device Operating Temperature Range (特殊范围需填或者空白 Special Range or None)
⑦ 内部补充代码 Internal Supplementary Code (数字或者空白 Number or None)

印字信息 Marking Information

- 印字中“”为群芯品牌 LOGO
“”denotes LOGO
- 印字中“Y”代表年份; A(2018),B(2019),C(2020).....
“Y”denotes YEAR: A(2018), B(2019), C(2020).....
- 印字中“WW”代表周号
“WW”denotes Week's number
- 印字中“N”代表星期几
“N”denotes day of the week.
- 印字中的“H”代表无卤
“H”denotes Halogen-free



绝缘和安规信息 Insulation and Safety related specifications

项目 Item	符号 Symbol	数值 Value	单位 Unit	备注 Remark
爬电距离 Creepage Distance	L	≥ 5	mm	从输入端到输出端，沿本体最短距离路径 Measured from input terminals to output terminals, shortest distance path along body
电气间隙 Clearance Distance	L	≥ 5	mm	从输入端到输出端，通过空气的最短距离 Measured from input terminals to output terminals, shortest distance through air
绝缘距离 Insulation Thickness	DTI	> 0.4	mm	发射器和探测器之间的绝缘厚度 Insulation thickness between emitter and detector
峰值隔离电压 Peak Isolation Voltage	V_{IORM}	600	V_{peak}	DIN/EN/DIN EN60747-5-5
瞬态隔离电压 Transient isolation voltage	V_{IOTM}	5000	V_{peak}	DIN/EN/DIN EN60747-5-5
隔离电压 Isolation Voltage	V_{iso}	> 3750	V_{rms}	For 1 min, RH < 60%

极限参数 Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

参数 Parameter		符号 Symbol	额定值 Rating	单位 Unit
发射端 Input	正向电流 Forward Current	I_F	50	mA
	反向电压 Reverse Voltage	V_R	6	V
	峰值正向电流(1us, 脉冲) Peak forward current (1us, pulse)	I_{FP}	1000	mA
	功耗 Power Dissipation	P_D	60	mW
接收端 output	集电极功耗 Collector Power Dissipation	P_C	150	mW
	集电极电流 Collector Current	I_C	90	mA
	集电极-发射极电压 Collector-Emitter Voltage	V_{CEO}	40	V
	发射极-集电极电压 Emitter-Collector Voltage	V_{ECO}	6	V
总功耗 Total Power Dissipation		P_{tot}	150	mW
隔离电压 Isolation Voltage		V_{iso}	3750	V_{rms}
工作温度 Operating Temperature		T_{opr}	$-55 \sim +110$	$^\circ\text{C}$
存储温度 Storage Temperature		T_{stg}	$-55 \sim +125$	$^\circ\text{C}$
焊接温度 Soldering Temperature		T_{sol}	260	$^\circ\text{C}$

产品特性参数 Electro-optical Characteristics (Ta=25°C)

参数 Parameter		符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
发射端 Input	正向电压 Forward Voltage	V_F	$I_F=20\text{mA}$	-	1.25	1.4	V
	反向电流 Reverse Current	I_R	$V_R=4\text{V}$	-	-	10	μA
	输入电容 Terminal Capacitance	C_t	$V=0, F=1\text{KHz}$	-	30	250	pF
接收端 Output	集电极暗电流 Collector Dark Current	I_{CEO}	$V_{CE}=10\text{V}$	-	-	1000	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CEO}	$I_C=0.1\text{mA}, I_F=0$	40	-	-	V
	发射极-集电极击穿电压 Emitter-Collector Breakdown Voltage	BV_{ECO}	$I_E=0.001\text{mA}, I_F=0$	6	-	-	V
传输特性 Transfer Characteristics	电流传输比 Current Transfer Ratio	CTR*	$I_F=1\text{mA}, V_{CE}=2\text{V}$	600	-	-	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_F=20\text{mA}, I_C=5\text{mA}$	-	0.8	1	V
	隔离电阻 Isolation Resistance	R_{ISO}	DC=500V 40~60%R.H.	5×10^{10}	-	-	Ω
	隔离电容 Isolation capacitance	C_{ISO}	$V=0, F=1\text{MHz}$	-	0.6	1.0	pF
	截止频率 Cut-off frequency	F_c	$V_{CE}=5\text{V}, I_C=2\text{mA},$ $R_L=100\Omega, -3\text{dB}$	-	6	-	KHz
	上升时间 Rise Time	T_r	$V_{CE}=2\text{V}, I_C=10\text{mA},$ $R_L=100\Omega$	-	15	-	μs
	下降时间 Fall Time	T_f		-	15	-	μs

注*: 电流传输比= $I_C/I_F \times 100\%$ 。Note*: $CTR=I_C/I_F \times 100\%$ 。

典型光电特性曲线 Typical Electro-Optical Characteristics Curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current

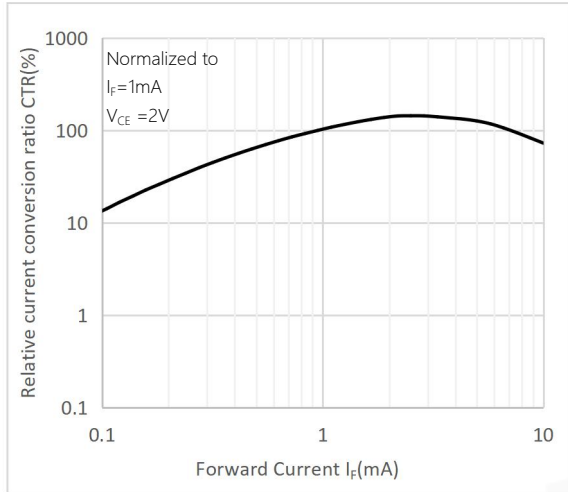


Fig.2 Forward Current vs. Forward Voltage

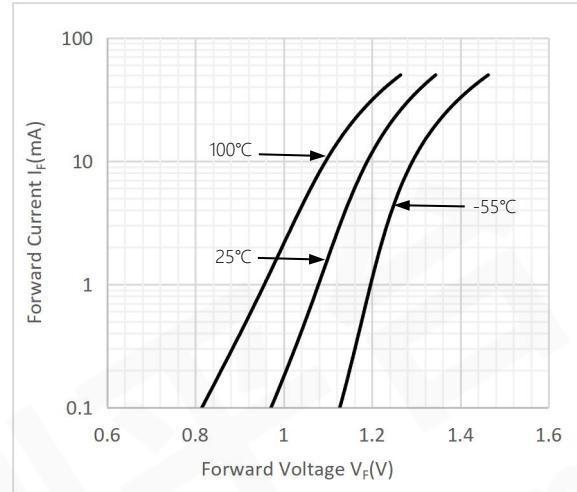


Fig.3 Collector Current vs. Collector-emitter Voltage

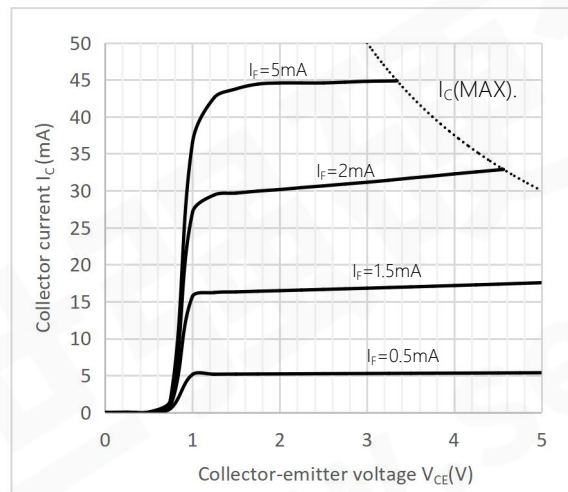


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

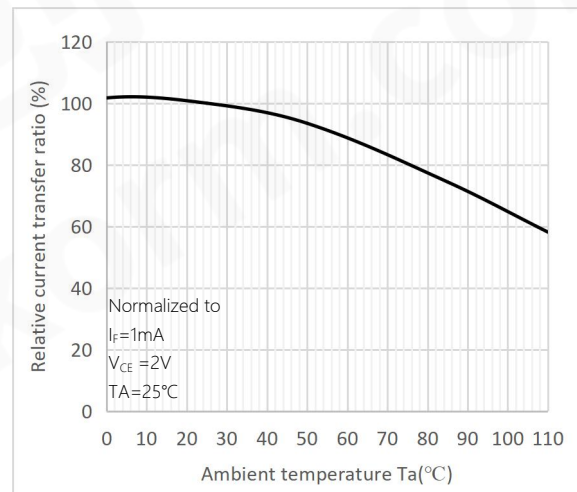


Fig.5 Collector Dark Current vs Ambient Temperature

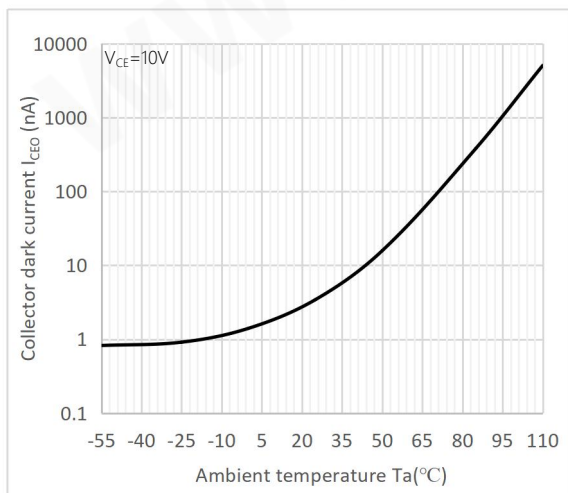


Fig.6 Response Time vs. Load Resistance

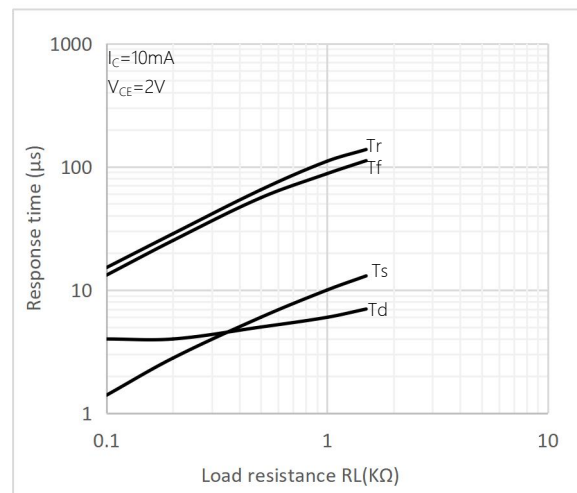
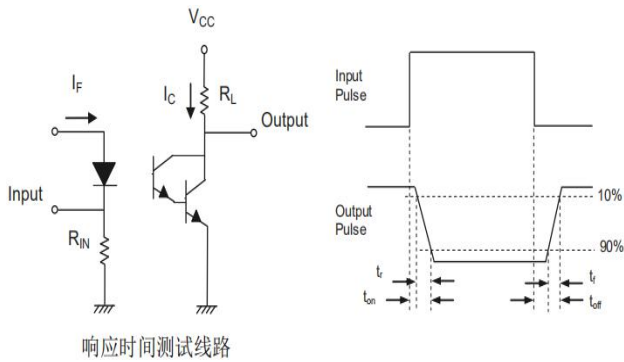
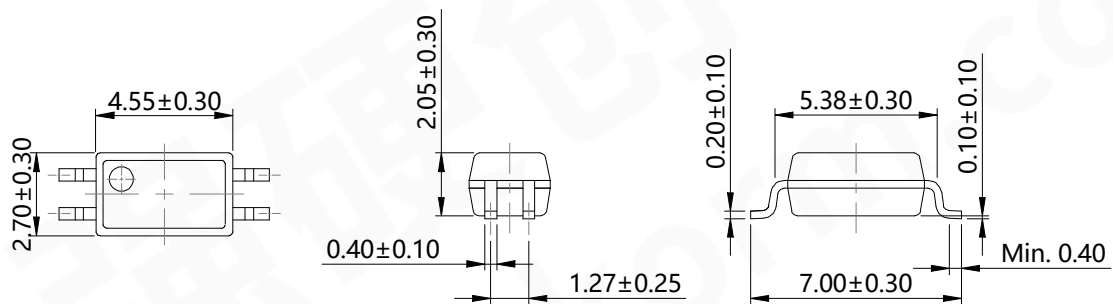


Fig.7 Switching Time Test Circuit & Waveforms



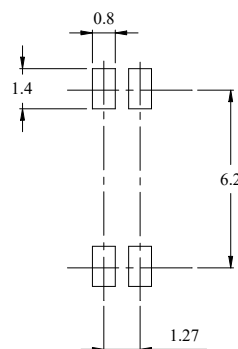
外形尺寸 Outline Dimensions

SSOP4



单位 Unit: mm

建议焊盘布局 Recommended Pad Layout

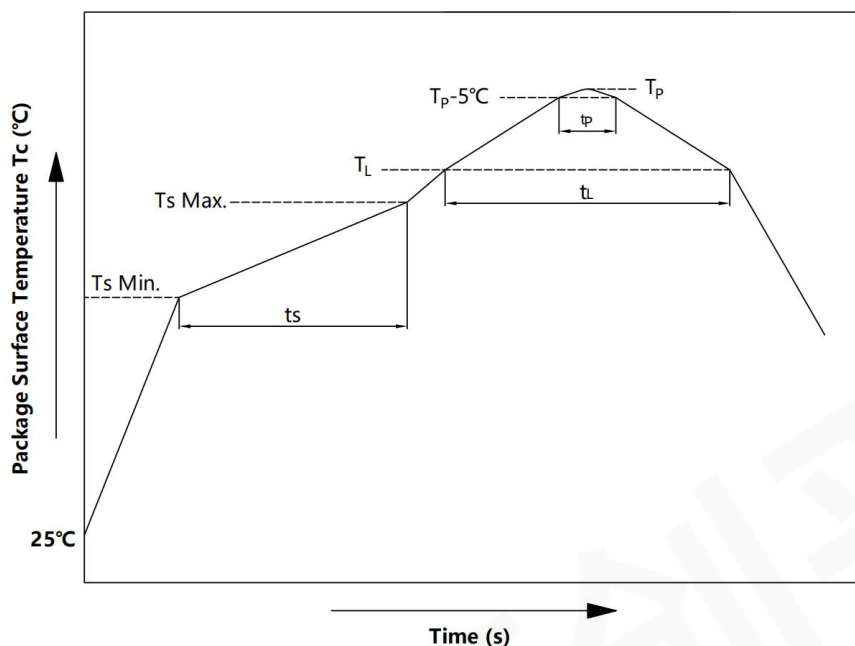


单位 Unit: mm

注：上图为产品正视图。

Note: The picture above is the front view of the product.

回流焊温度曲线图 Solder Reflow Profile



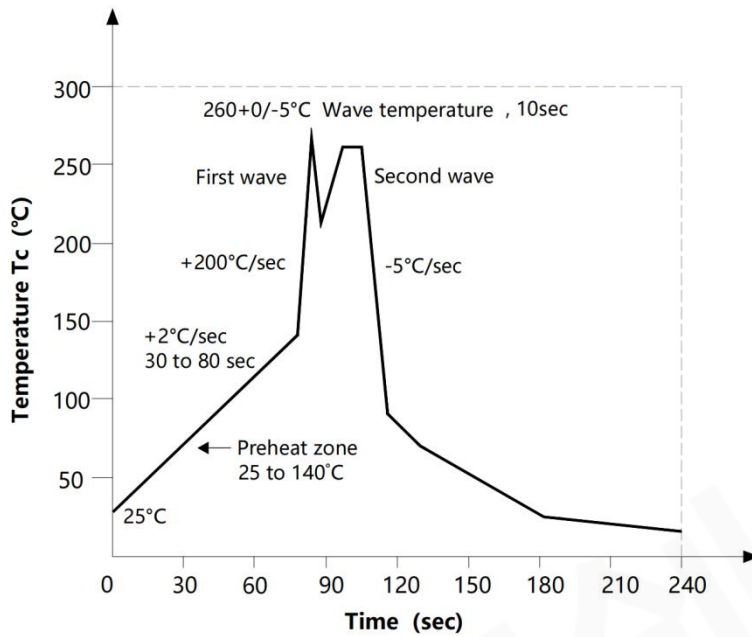
项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	T_s	150	200	$^{\circ}\text{C}$
预热时间 Preheat Time	t_s	60	120	s
升温速率 Ramp-Up Rate (T_L to T_p)	-	-	3	$^{\circ}\text{C/s}$
液相线温度 Liquidus Temperature	T_L	217		$^{\circ}\text{C}$
时间高于 T_L Time Above T_L	t_L	60	150	s
峰值温度 Peak Temperature	T_p	-	260	$^{\circ}\text{C}$
T_c 在 $(T_p - 5)$ 和 T_p 之间的时间 Time During Which T_c Is Between $(T_p - 5)$ and T_p	t_p	-	30	s
降温速率 Ramp-down Rate (T_p to T_L)	-	-	6	$^{\circ}\text{C/s}$

注 Note:

建议在所示的温度和时间条件下进行回流焊，最多不能超过三次；

Reflow soldering is recommended at the temperatures and times shown, no more than three times;

波峰焊温度曲线图 Wave Soldering Profile



手工烙铁焊接 Soldering with hand soldering iron

A. 手工烙铁焊仅用于产品返修或样品测试;

Hand soldering iron is only used for product rework or sample testing;

B. 手工烙铁焊要求: 温度 $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 时间 $\leq 3\text{s}$ 。

Hand soldering iron requirements: Temperature: $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$, within 3s.

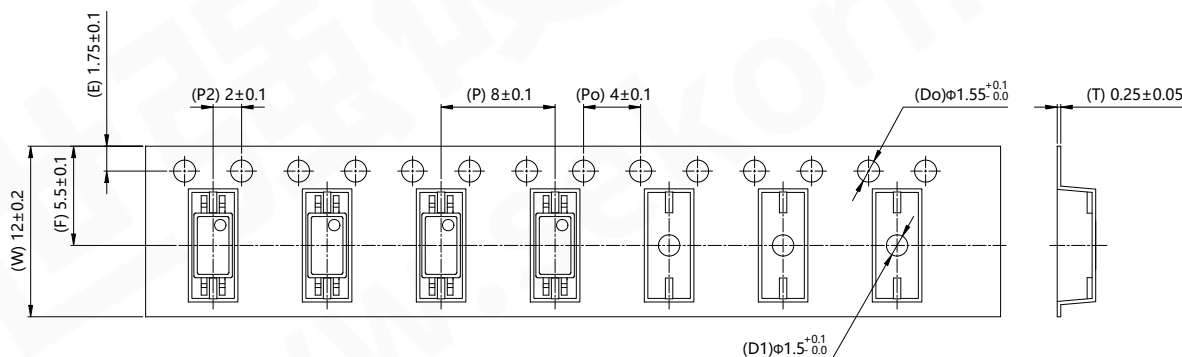
包装 Packing

■ 汇总表 Summary table

封装形式	包装方式	盘数量	盒数量	箱数量	静电袋规格	盒规格	箱(双瓦楞)规格	备注
SSOP4	卷盘 ($\phi 330$ mm 卷盘)	3000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	353*340*60mm	650.375.365mm	首端各空 50 个空格, 末端空 100
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
SSOP4	Reel ($\phi 330$ mm Blue)	3000 pcs /reel	2 reels /box	10 boxes /ctn	450*390*0.1mm	353*340*60mm	650.375.365mm	Leave 50 Spaces at the beginning and 100 Spaces at the end

■ 编带包装 Tape & Reel

- 1) 每卷数量: 3000 只。
Qty/reel: 3000 pcs.
- 2) 每箱数量: 60000 只。
Qty/ctn: 60000 pcs.
- 3) 内包装: 每盒 2 盘。
Inner packing: 2 reels/box.
- 4) 示意图 Schematic:



单位 Unit: mm

注意 Attention

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