SEMICONDUCTOR
TOSHIBA
TECHNICAL DATA

TOSHIBA PHOTOCOUPLER
TLP624, TLP624-2, TLP624-4
GaAs IRED & PHOTO-TRANSISTOR

(TLP624)
PROGRAMMABLE CONTROLLERS
AC / DC-INPUT MODULE
TELECOMMUNICATION

The TOSHIBA TLP624, -2 and -4 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-transistor. The TLP624-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP624-4 provides four isolated channels in a sixteen plastic DIP package.

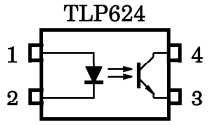
- Collector-Emitter Voltage : 55V Min.
- Current Transfer Ratio

CLASSIFICATION	CURRENT TRANSFER RATIO (Min.)			MARKING OF CLASSIFICATION
	Ta = 25°C		Ta = −25~75°C	
	I_F = 1mA V_{CE} = 0.5V	I_F = 0.5mA V_{CE} = 1.5V	I_F = 1mA V_{CE} = 0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, Blank

- Isolation Voltage : $5000V_{rms}$ Min.
- UL Recognized : UL1577 File No. E67349
- Note : Application type name for certification test, please use standard product type name, i.e.
  TLP624 (BV) : TLP624
  TLP624-2 (BV) : TLP624-2

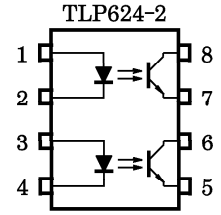
PIN CONFIGURATIONS (TOP VIEW)

TLP624



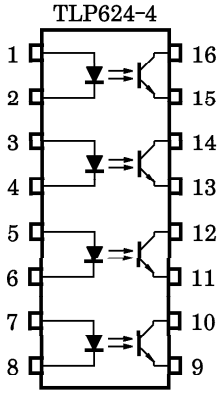
1. ANODE
2. CATHODE
3. EMITTER
4. COLLECTOR

TLP624-2



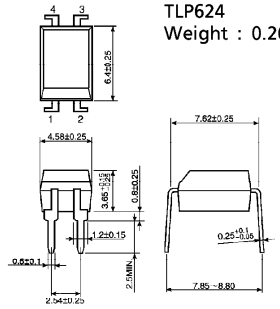
1, 3 : ANODE
2, 4 : CATHODE
5, 7 : EMITTER
6, 8 : COLLECTOR

TLP624-4

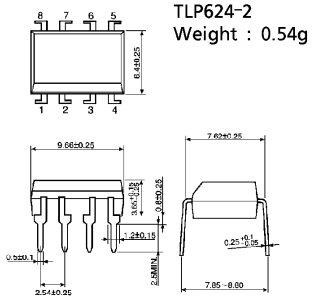


1, 3, 5, 7 : ANODE
2, 4, 6, 8 : CATHODE
9, 11, 13, 15 : EMITTER
10, 12, 14, 16 : COLLECTOR

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-5B2



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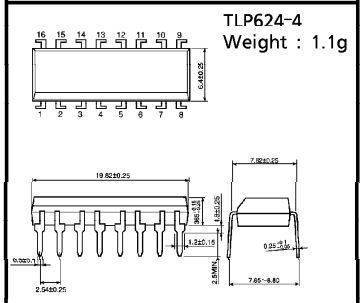
EIAJ	—
TOSHIBA	11-10C4



JEDEC	—
EIAJ	—
TOSHIBA	11-20A3

(TLP624)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP624	TLP624-2 TLP624-4	
LED	Forward Current	I_F	60	50	mA
	Forward Current Detating	ΔI_F / °C	−0.7 (Ta≧39°C)	−0.5 (Ta≧25°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100μs pulse, 100pps)		A
	Power Dissipation (1 Circuit)	P_D	100	70	mW
	Power Dissipation Derating (Ta≧25°C, 1 Circuit)	ΔP_D / °C	−1.0	−0.7	mW/°C
	Reverse Voltage	V_R	5		V
	Junction Temperature	T_j	125		°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55		V
	Emitter-Collector Voltage	V_{ECO}	7		V
	Collector Current	I_C	50		mA
	Collector Power Dissipation (1 Circuit)	P_C	150	100	mW
	Collector Power Dissipation Derating (Ta≧25°C, 1 Circuit)	ΔP_C / °C	−1.5	−1.0	mW / °C
	Junction Temperature	T_j	125		°C
Storage Temperature Range		T_{stg}	−55~150		°C
Operating Temperature Range		P_{opr}	−55~100		°C
Lead Soldering Temperature		T_{sol}	260 (10s)		°C
Total Package Power Dissipation (1 Circuit)		P_T	250	150	mW
Total Package Power Dissipation Derating (Ta≧25°C, 1 Circuit)		ΔP_T / °C	−2.5	−1.5	mW / °C
Isolation Voltage (Note 1)		BV_S	5000 (AC, 1min., RH≦60%)		Vrms

Note 1 : Device considered a two terminal device : LED side pins shorted together, and DETECTOR side pins shorted together.

(TLP624)

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)\,CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)\,ECO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24V	—	10	100	nA
			V_{CE} = 24V, Ta = 85°C	—	2	50	μA
	Capacitance Collector to Emitter	C_{CE}	V = 0, f = 1MHz	—	12	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	I_F = 1mA, V_{CE} = 0.5V	100	—	1200	%
		Rank BV	200	—	1200	
Low Input CTR	I_C / I_F (low)	I_F = 0.5mA, V_{CE} = 1.5V	50	—	—	%
		Rank BV	100	—	—	
Collector-Emitter Saturation Voltage	V_{CE} (sat)	I_C = 0.5mA, I_F = 1mA	—	—	0.4	V
		I_C = 1mA, I_F = 1mA	—	0.2	—	
		Rank BV	—	—	0.4	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = −25°C~75°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	I_F = 1mA, V_{CE} = 0.5V	50	—	—	%
		Rank BV	100	—	—	
Low Input CTR	I_C / I_F (low)	I_F = 0.5mA, V_{CE} = 1.5V	—	50	—	%
		Rank BV	—	100	—	

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ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	C_S	V_S=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S=500V	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

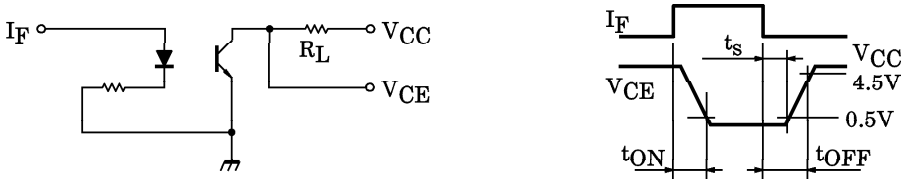
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC}=10V, I_C=2mA R_L=100Ω	—	8	—	μs
Fall Time	t_f		—	8	—	
Turn-on Time	t_{on}		—	10	—	
Turn-off Time	t_{off}		—	8	—	
Turn-on Time	t_{ON}	R_L=4.7kΩ (Fig.1) V_{CC}=5V, I_F=1.6mA	—	10	—	μs
Storage Time	t_s		—	50	—	
Turn-off Time	T_{OFF}		—	300	—	

RECOMMENDED OPERATING CONDITIONS

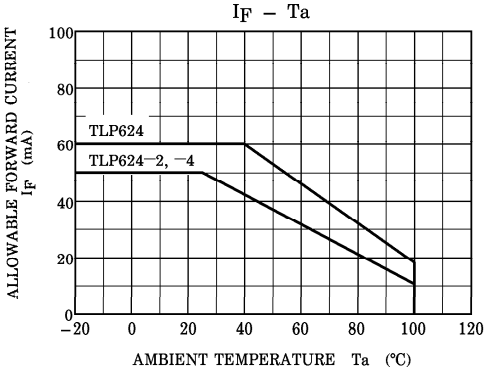
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F	—	1.6	20	mA
Collector Current	I_C	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	75	°C

Fig. 1 SWITCHING TIME TEST CIRCUIT

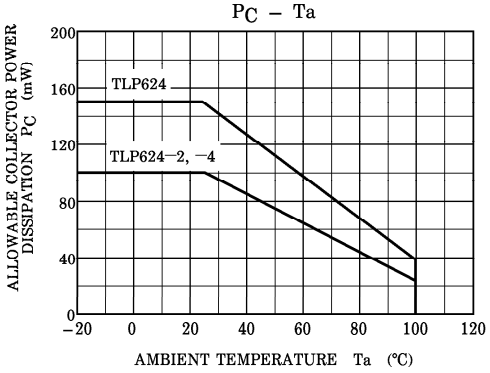


(TLP624)

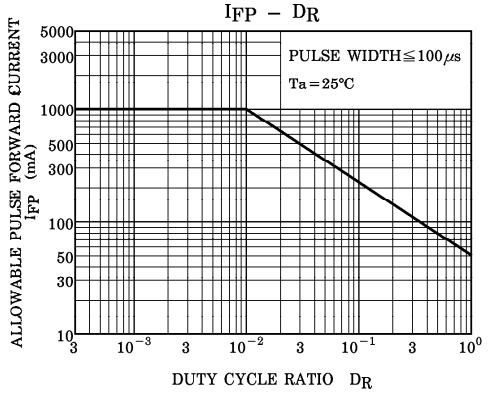
I_F – Ta



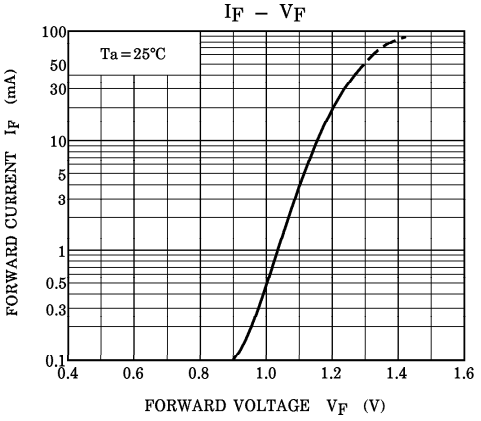
P_C – Ta



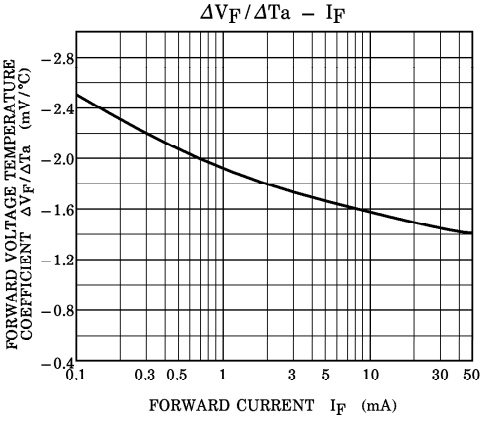
I_{FP} – D_R



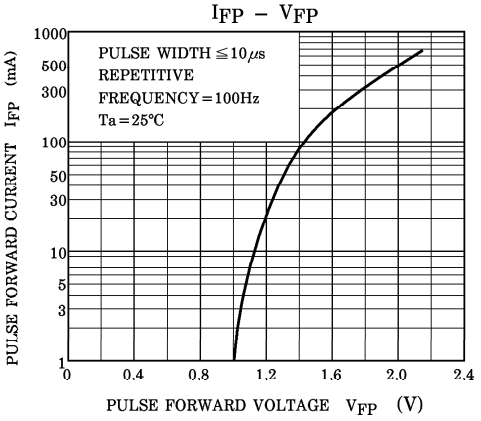
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F

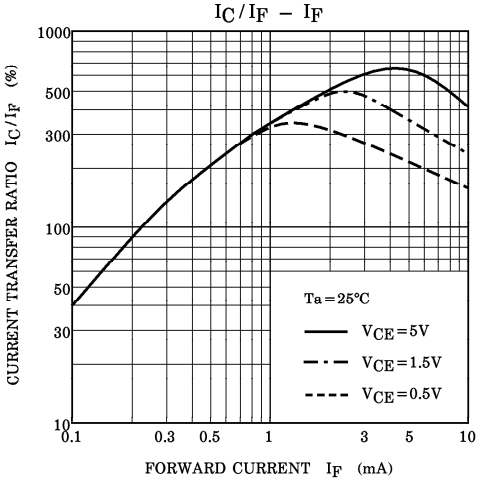


I_{FP} – V_{FP}

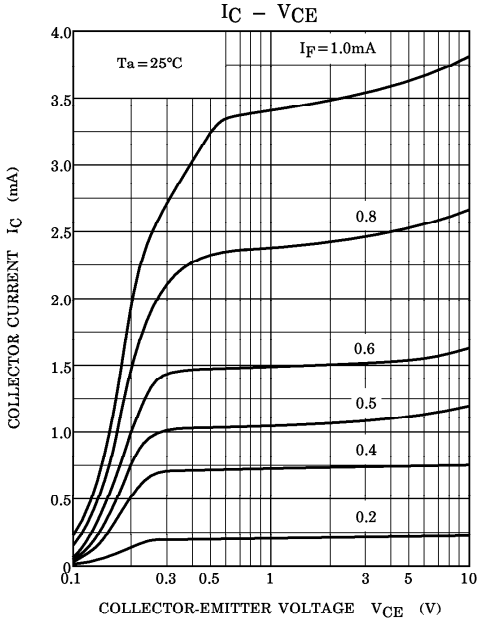


(TLP624)

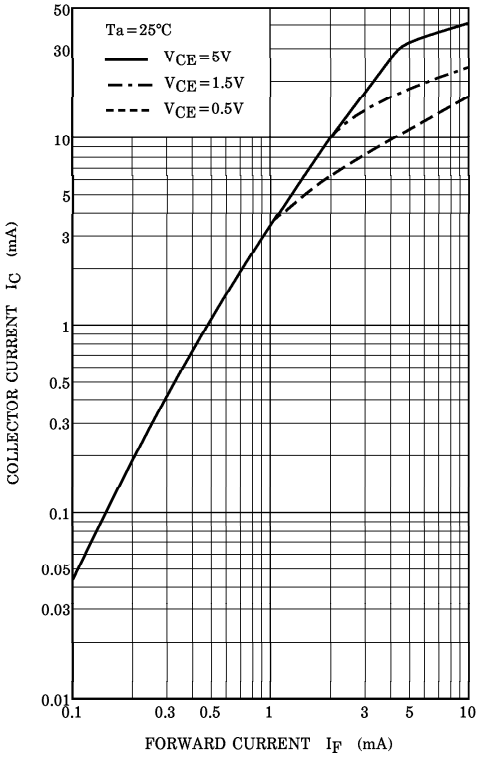
$I_C / I_F - I_F$



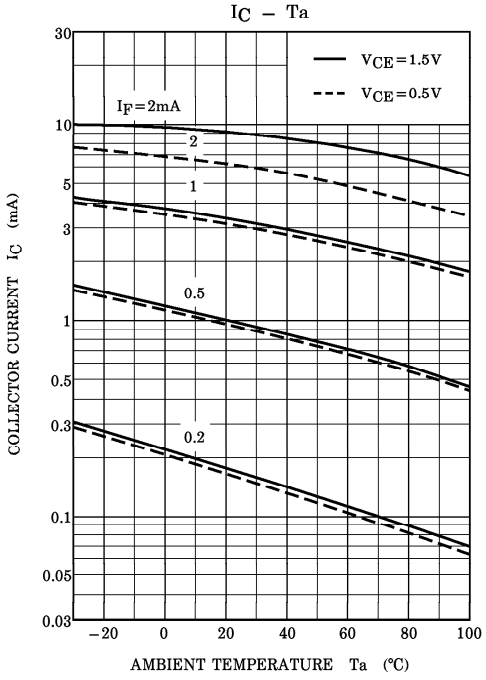
$I_C - V_{CE}$



$I_C - I_F$



$I_C - Ta$



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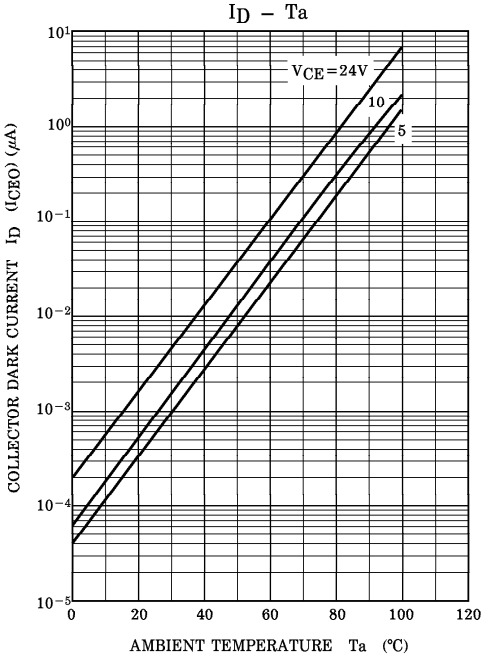
I_D – Ta



SWITCHING TIME – R_L