

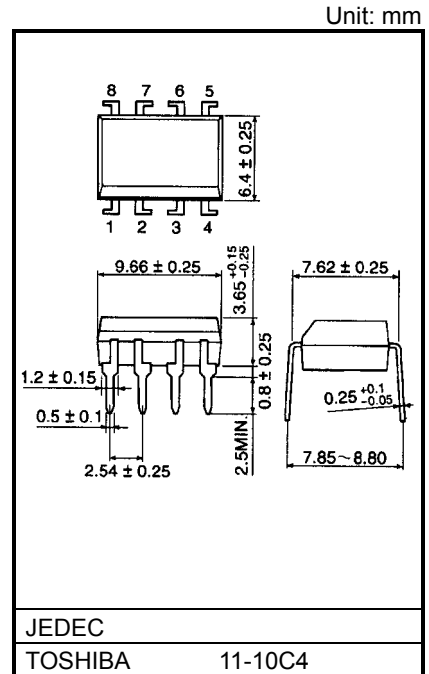
# TLP554

ISOLATED LINE RECEIVER  
 SIMPLEX/MULTIPLEX DATA TRANSMISSION  
 COMPUTER-PERIPHERAL INTERFACE  
 MICROPROCESSOR SYSTEM INTERFACES  
 DIGITAL ISOLATION FOR A/D,D/A CONVERSION

The TOSHIBA TLP554 a photocoupler which combines a GaAIAsIRED as the emitter and an integrated high gain,high speed photodetector. The output of the detector circuit is an open collector,Schottky Clamped transistor.

A Faraday shield integrated on the photodetector chip reduces the effects of capacitive coupling between the input LED emitter and the high gain stages of the detector. This provides an effective common mode transient immunity of 1000V/us.

- Input Current Threshold : IF=5mA(Max.)
- Switching Speed : 10MBd(TYP,@NRZ)
- Common mode transient immunity : ±1000V/us(Min)
- Guaranteed PerformanceOverTemperature : 0~70°C
- Isolation Voltage : 2500Vrms(Min)
- UL Recognized : UL1577,File No.E67349

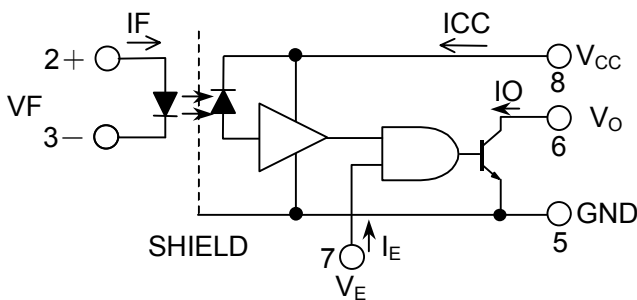


Weight: 0.54 g

### TRUTH TABLE(Positive Logic)

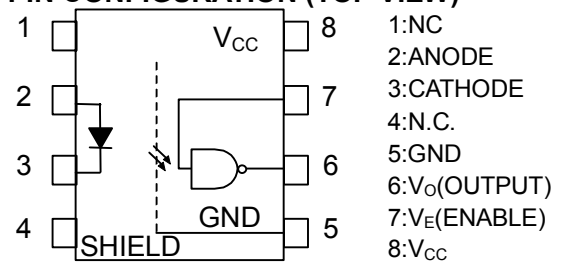
INPUT	ENABLE	OUTPUT
H	H	L
L	H	H
H	L	H
L	L	H

### SCHEMATIC



A 0.1μF bypass capacitor must be connected Between pins 8 and 5.(See Note 1)

### PIN CONFIGURATION (TOP VIEW)



**RECOMMENDED OPERATING CONDITIONS**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Low Level input Voltage	VFL	-3	0	1.0	V
High Level input current	IFH	6.3*	—	20	mA
Supply Voltage	VCC	4.5	5	5.5	V
High-Level Enable Voltage	VEH	2.0	—	VCC	V
Low-Level Enable Voltage	VEL	0	—	0.8	V
Fan Out(TTL Load)	N	—	—	8	—
Operating Temperature	Topr	0	—	70	°C

\*6.3mA condition permits at least 20% CTR degradation  
Initial switching threshold is 5.0mA or less.

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	IF	20	mA
	Reverse Voltage	VR	5	V
DETECTOR	Output Current	IO	25	mA
	Output Voltage	VO	-0.5~7	V
	Supply Voltage (Note 2)	VCC	7	V
	Enable Voltage (Note 3)	VE	5.5	V
	Output Power Dissipation	PO	40	mW
Storage Temperature Range		Tstg	-55~125	°C
Operating Temperature Range		Topr	-40~85	°C
Lead Soldering Temperature (10 s) (Note 4)		Tsol	260	°C
Isolation Voltage (AC, 1 minute, R.H.≤ 60%) (Note 5)		BVS	2500	Vrms

(Note 1) The V<sub>CC</sub> supply voltage to each TLP554 isolator must be bypassed by a 0.1μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package V<sub>CC</sub> and GND pins each device.

(Note 2) 1 Minute Maximum.

(Note 3) Not to exceed VCC by more than 500mV.

(Note 4) 2mm below seating plane.

(Note 5) Device considered a two-terminal device :Pins 1,2,3 and 4 shorted together,and Pins 5, 6,7 and 8 shorted together.

## ELECTRICAL CHARACTERISTICS (Ta = 0~70°C , VCC=4.5~5.5V , VFL≤1.0V)

CHARACTERISTIC		SYMBOL	TEST CONDITION		MIN.	TYP.*	MAX.	UNIT
Forward Voltage		V <sub>F</sub>	I <sub>F</sub> = 10 mA , Ta=25°C			1.65	1.80	V
Temperature Coefficient of Forward Voltage		ΔV <sub>F</sub> /ΔTa	I <sub>F</sub> = 10 mA ,		—	-2.0	—	mV/°C
Input Reverse Current		I <sub>R</sub>	V <sub>R</sub> =5V, Ta=25°C		—	—	10	μA
Input Capacitance		C <sub>T</sub>	V = 0 , f = 1MHz , Ta=25°C		—	45	—	pF
High-Level Output Current		IOH	V <sub>F</sub> = 1.0V V <sub>O</sub> = 5.5V V <sub>E</sub> = 2.0V	Ta=0~70°C	—	10	250	μA
				Ta=25°C	—	0.5	10	
Low-Level Output Voltage		VOL	I <sub>F</sub> =5mA , V <sub>E</sub> =2.0V , IOL=13mA		—	0.4	0.6	V
High Level input current		IFH	IOL=13mA , V <sub>E</sub> =2.0V , VOL=0.6V		—	—	5	mA
Supply Current	High Level	ICCH	VCC=5.5V V <sub>E</sub> =0.5V	I <sub>F</sub> =0mA	—	7	15	mA
	Low Level	ICCL		I <sub>F</sub> =10mA	—	12	19	
Enable Current	High Level	IEH	VCC=5.5V	V <sub>E</sub> =2.0V	—	-1.0	—	mA
	Low Level	IEL		V <sub>E</sub> =0.5V	—	-1.6	-2.0	
Enable Voltage	High Level	VEH	— (Note 6)		2.0	—	—	V
	Low Level	VEL	—		—	—	0.8	
Capacitance (Input-Output)		CS	V <sub>S</sub> =0 , f=1MHz , Ta=25°C		—	0.6	—	pF
Resistance (Input-Output)		RS	V <sub>S</sub> =500V , Ta=25°C , R.H. ≤60%		5 × 10 <sup>10</sup>	10 <sup>14</sup>	—	Ω

(\*)All typ. values are at Ta=25°C

(Note 6) No pull up resistor required as the device has an internal pull up resistor.

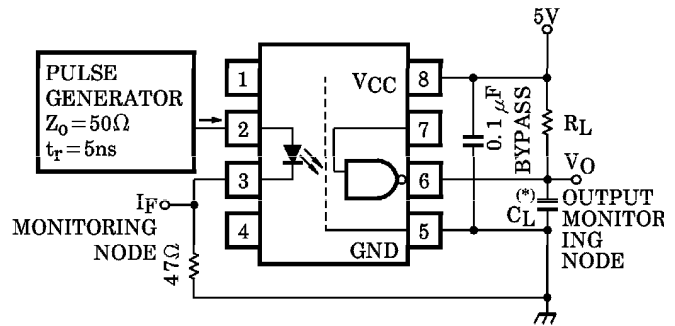
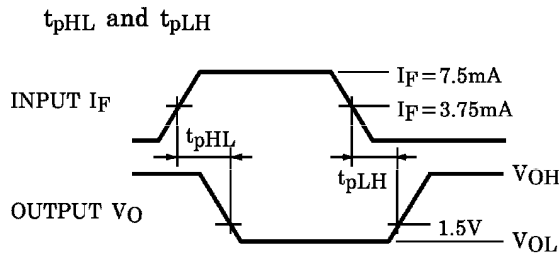
**SWITCHING CHARACTERISTICS (Ta = 25°C , Vcc=5V)**

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT	
Propagation Delay Time	L→H	tpLH	1	RL=350Ω	IF=7.5→0mA	—	60	120	ns	
	H→L	tpHL		CL=15pF	IF=0→7.5mA	—	60	120		
Output Rise Time(10-90%)		tr		IF=7.5→0 / 0→7.5mA RL=350Ω , CL=15pF			—	30	—	ns
Output Fall Time(10-90%)		tf					—	30	—	
Enable Propagation Delay Time		tELH	2	RL=350Ω	VE=0.5→3.0V	—	25	—	ns	
		tEHL		CL=15pF	IF=7.5 mA	VE=3.0→0.5V	—	25		—
Common Mode Transient Immunity at Hight Level Outout		CM <sub>H</sub>	3	VCM=400V	IF=0mA VO(Min)=2.0V	1000	10000	—	V/μs	
Common Mode Transient Immunity at Low Level Outout		CM <sub>L</sub>		RL=350Ω (Note 7)	IF=7.5mA VO(Max)=0.8V	-1000	-10000	—		

(Note 7) CM<sub>H</sub>: The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high state(i.e.,VOUT>2.0V)  
 CM<sub>L</sub>: The maximum tolerable rate of fall of the common mode voltage to ensure the output will remain in the low output state(i.e.,VOUT<0.8V)  
 Measured in volts per microsecond(V/μs).

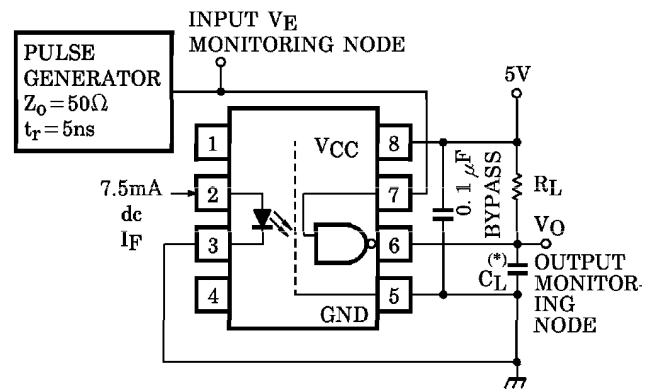
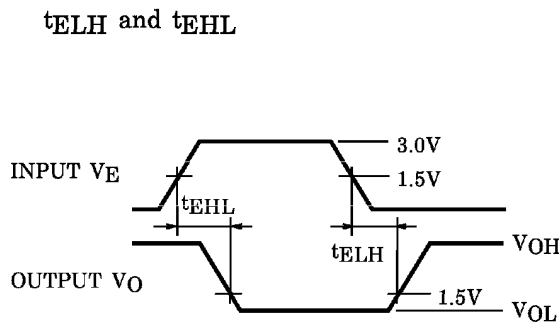
(Note 8) Maximum electrostatic discharge voltage for any pins:180V(C=200pF,R=0)

TEST CIRCUIT 1.



(\*)  $C_L$  is approximately 15pF which includes probe and stray wiring capacitance.

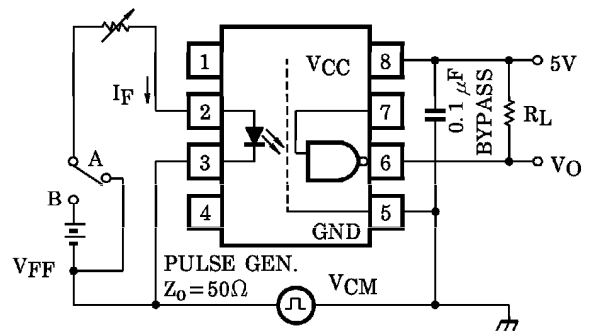
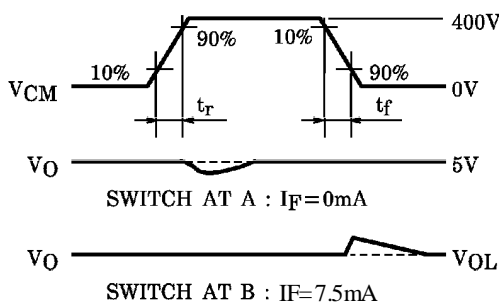
TEST CIRCUIT 2.

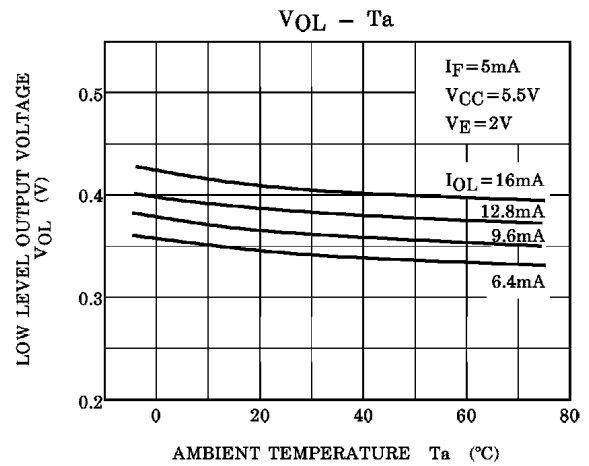
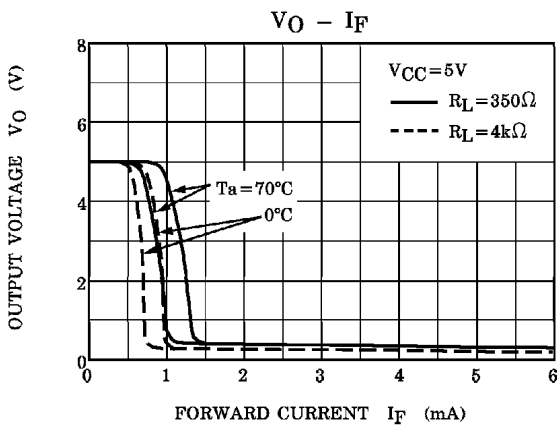
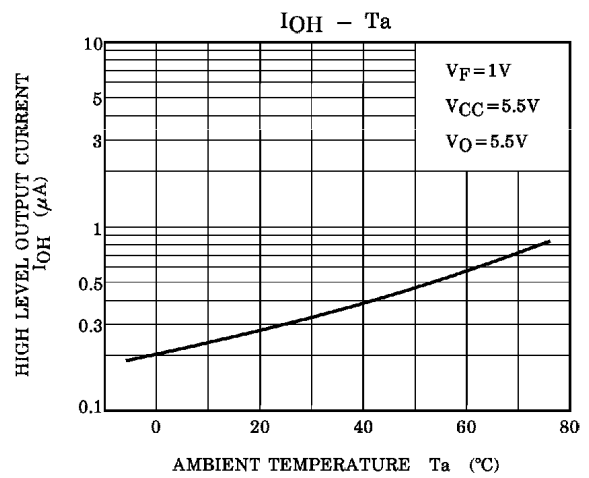
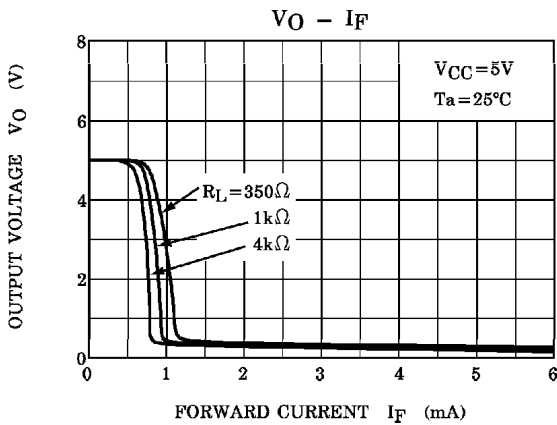
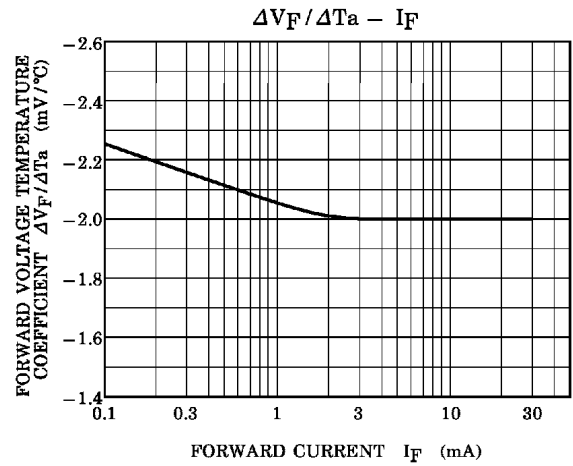
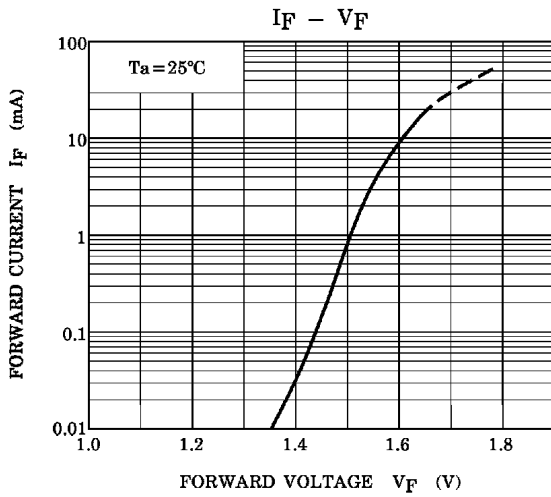


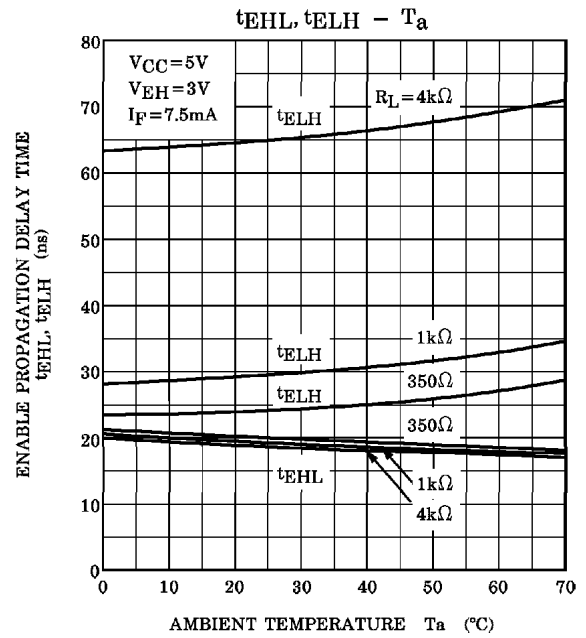
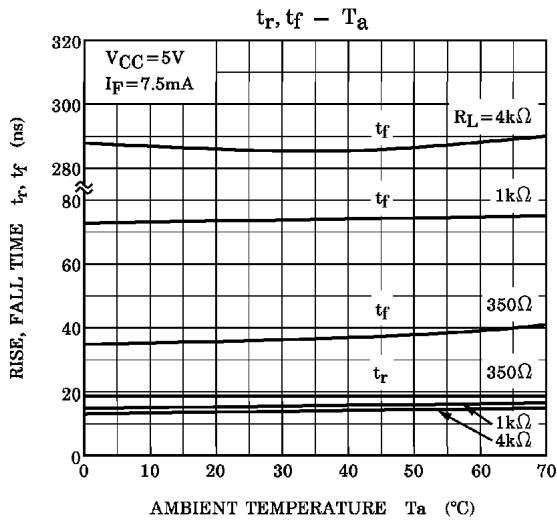
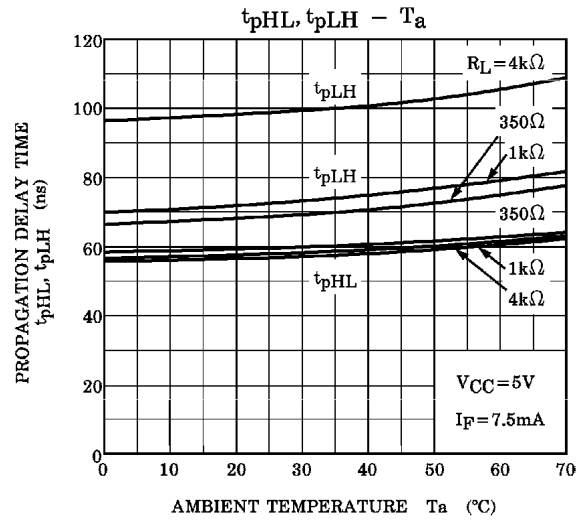
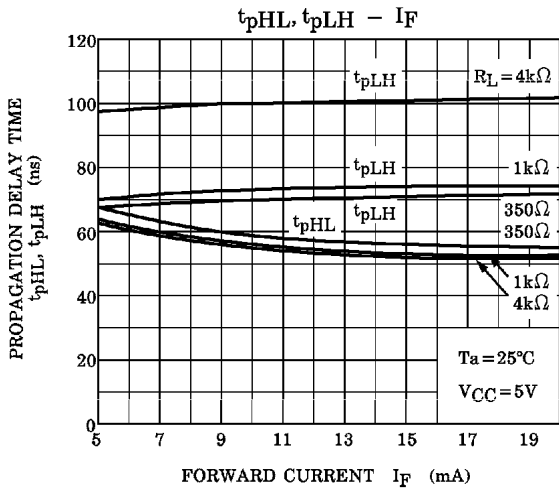
(\*)  $C_L$  is approximately 15pF which includes probe and stray wiring capacitance.

TEST CIRCUIT 3.

Transient Immunity and Typ. Waveforms.







**RESTRICTIONS ON PRODUCT USE**

000707EBC

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.