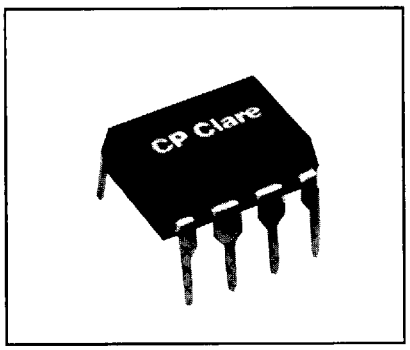
OptoMOS® "TS" Series Multifunction Solid State Telecom Switches



DESCRIPTION

CP Clare's "TS" series telecom switches provide optimal function density for tip/ring interface circuits. The "TS" Series incorporates an optically isolated solid state relay for hookswitch, dial-pulse or loop start switching with a bi-directional optocoupler for detection of ringing signal or loop current (off-hook/on-hook).

The "TS" products may be used to switch and detect AC or DC. Aside from the obvious advantage of board space savings, there are significant cost savings due to the elimination of up to eight discrete components.

FEATURES

- Two Functions in One Package (Hookswitch and Ring Detect/ Loop Detect)
- Small 8 pin DIP Package (.370 length)
- Bi-directional Current Sensing
- Bi-directional Current Switching
- Replaces up to Eight Components
- 3750 V_{RMS} Input/Output Isolation
- FCC Compatible
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Surface Mount and Tape & Reel Version Available
- UL Recognized: File Number E76270
- CSA, VDE Compatible
- BABT: Certified to BS415: 1990- Certificate Number 7023
- BABT: Certified to BS7002: 1989, EN60950: 1988 Certificate Number 7344
- BABT: Complies with EN41003: 1991 and BS6301: 1989 (Supplementary Insulation) Clause 3.2.3.2

APPLICATIONS

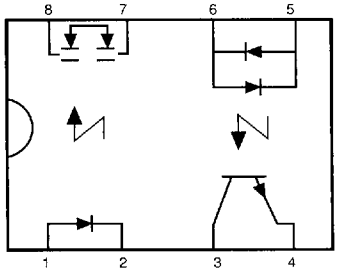
- Telecom Switching
- Tip/Ring Circuits
- Modem Switching (Laptop, Notebook, Pocket Size)
- Hookswitch
- Dial Pulsing
- Ground Start
- Ringer Injection
- Loop Detect
- Ring Detect

RATINGS (@ 25°C)

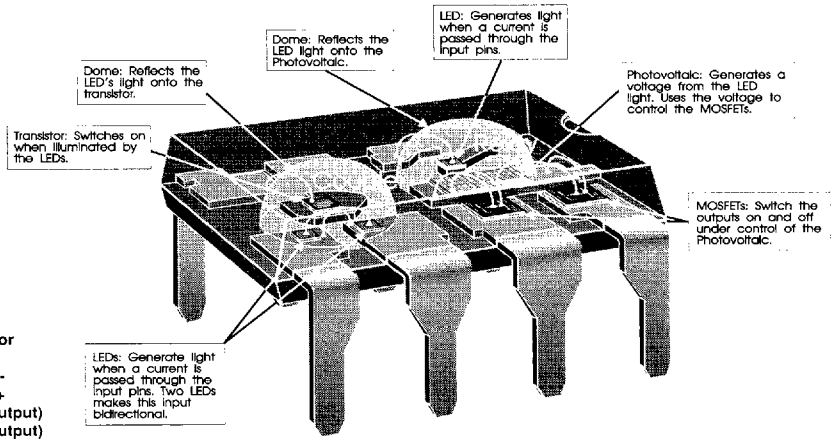
Parameter	Min	Typ	Max	Units
Input Power Dissipation	—	—	150[1]	mW
Input Control Current	—	—	100	mA
Peak (10mSec)	—	—	1	A
Reverse Input Voltage	—	—	5	V
Phototransistor	—	—	150[2]	mW
Power Dissipation				
Total Package Dissipation	—	—	800[3]	mW
Capacitance				
Input to Output	—	3	—	pF
Isolation Voltage				
Input to Output	2500	—	—	V_{RMS}
"E" Suffix (Optional)	3750	—	—	V_{RMS}
Operating Temperature	-40	—	85	°C
Storage Temperature	-40	—	125	°C
Soldering Temperature (10 Seconds Max)	—	—	260	°C

[1] Derate Linearly 1.33 mW/°C.
[2] Derate Linearly 2.0 mW/°C.
[3] Derate Linearly 6.67 mW/°C.

Equivalent Circuit



1.+ LED-Relay
2. - LED-Relay
3. Collector-Phototransistor
4. Emitter-Phototransistor
5. LED-Phototransistor +/-
6. LED- Phototransistor -/+
7. Load-Relay (MOSFET output)
8. Load-Relay (MOSFET output)



OptoMOS® Solid State Telecom Switches

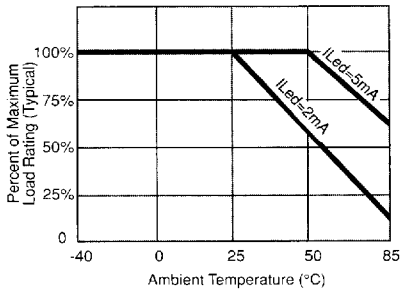
	Specifications		TS117	TS118	TS120	TS122	TS190	Units
Types of Relays	(Form A=Norm. Open, Form B=Norm. Closed)		Form A	Form B	Form A	Form A	Form A	
1. Relay Portion (Pins 1,2,7,8)								
OUTPUT CHARACTERISTICS (PINS 7,8) @ 25°C	Load Voltage, DC or Peak AC		350	350	350	250	400	V
	Load Current, Continuous		120	120	120	170	150	mA
	Peak Load Current (10mSec)		350	350	350	400	350	mA
	On-Resistance	Min	15	15	15	10	10	
	@ Rated Load Current	Typ	23	23	23	12	15	Ω
		Max	35	35	35	20	22	
	Off State Leakage Current @ Rated Load Voltage	Max	1	1	1	1	1	µA
	Typical Output Capacitance @ 50V, f = 1MHz		25	25	25	50	25	pF
	Ton @ I_{LED} = 5mA							
	[A] (Also Operates at 2mA with	Typ	1[A]	1	1	1	0.4	mS
	Ton ≤ 5mS, Toff ≤ 3mS max)[1]	Max	3[A]	3	2.5	3	1	
	Toff @ I_{LED} = 5mA	Typ	1	1	1	1	0.1	mS
		Max	3	3	2.5	3	0.25	
INPUT CHARACTERISTICS (PINS 1,2) @ 25°C	Input Control Current	Typ	1	2	2	2	2	mA
	I_{LED}	Max	2	5	5	5	5	
	Input Voltage Drop	Min	0.9	0.9	0.9	0.9	0.9	
	V_F @ 5mA	Typ	1.2	1.2	1.2	1.2	1.2	V
		Max	1.4	1.4	1.4	1.4	1.4	
	Reverse Input Current	Max	10	10	10	10	10	µA
	Reverse Input Voltage	Max	5	5	5	5	5	V
2. Detector Portion (Pins 3,4,5,6)								
OUTPUT CHARACTERISTICS (PINS 3,4) @ 25°C	Phototransistor BV_{CEO} @ I_C = 10µA	Min	20	20	20	20	20	V
		Typ	50	50	50	50	50	
	Phototransistor I_{CEO} V_{CE} = 5V, I_{LED} = 0mA	Typ	50	50	100	50	50	nA
		Max	500	500	1000	500	500	
	Saturation Voltage I_C = 2mA, I_{LED} = 16mA	Typ	0.3	0.3	0.5[B]	0.3	0.3	V
	[B] I_C = .15mA, I_{LED} = .05mA (Darlington)	Max	0.5	0.5	0.8[B]	0.5	0.5	
	Current Transfer Ratio I_{LED} = 6mA, V_{CE} = 0.5V	Min	33	33	300[C]	33	33	%
	[C] I_{LED} = 0.05mA, V_{CE} = 0.8V (Darlington)	Typ	100	100	1000[C]	100	100	
INPUT CHARACTERISTICS (PINS 5,6) @ 25°C	Input Control Current I_C = 2mA, V_{CE} = 0.5V	Typ	2	2	1[D]	2	2	mA
	[D] I_C = 20mA, V_{CE} = 0.8V (Darlington)	Max	6	6	2[D]	6	6	
	Input Voltage Drop V_F @ 5mA	Min	0.9	0.9	0.9	0.9	0.9	
		Typ	1.2	1.2	1.2	1.2	1.2	V
		Max	1.4	1.4	1.4	1.4	1.4	
	Input Current, Detector must be off I_C = 1µA, V_{CE} = 5V	Min	5	5	N/A	5	5	µA
		Typ	25	25	N/A	25	25	
Input to Output Isolation With "E" Suffix (optional)			2500 3750	2500 3750	2500 3750	2500 3750	2500 3750	V_{RMS}
Current Limiting Version Available[1] (Add "L" Suffix To Part Number)			Yes	No	Yes	Yes	Yes	

[1] Current limiting adds 5 ohms to the total on-resistance of the device.

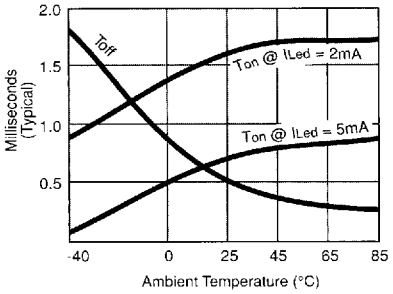
► NOTE: For Mechanical Dimensions refer to page 20.

Relay Portion

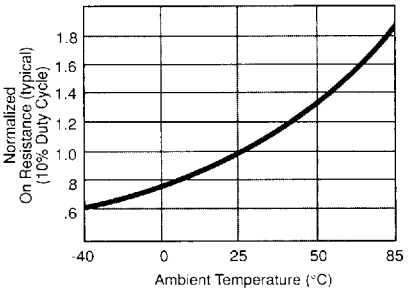
1) Load Current vs Ambient Temperature Characteristics



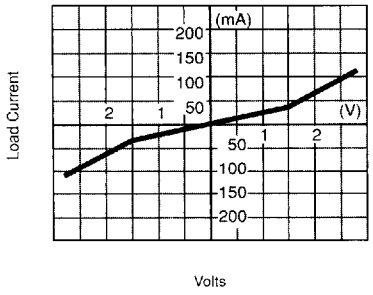
2) Switching Time (@ 2mA and 5mA) vs Ambient Temperature



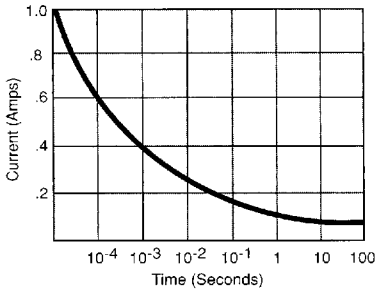
3) Normalized On-Resistance vs Ambient Temperature



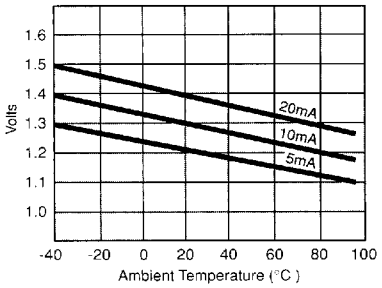
4) Load Voltage vs Load Current Characteristics (Typical)



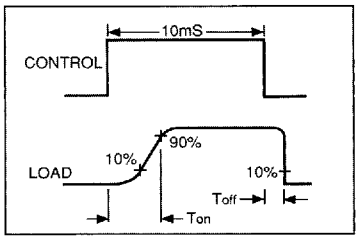
5) Energy Rating Curve Current vs Time



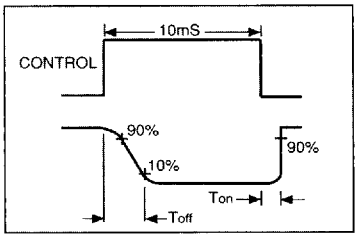
6) Typical Forward Voltage vs Temperature @ IF =5mA



7) Switching Characteristics of Normally Open (Form A) Devices

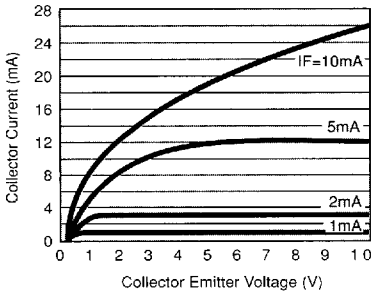


8) Switching Characteristics of Normally Closed (Form B) Devices



Detector Portion

9) Transfer Characteristics of Single Transistor Detector (Typical)



10) Transfer Characteristics of Darlington Transistor Detector (Typical)