TS112N

Multifunction Telecom Switch

	TS112N	Units
Load Voltage	350	V
Load Current	120	mA
Max R_{ON}	20	Ω

Features

- Small 8 Pin SOIC Narrow Package
- Low Drive Power Requirements (TTL/CMOS Compatible)
- No Moving Parts
- High Reliability
- Arc-Free With No Snubbing Circuits
- $1500V_{RMS}$ Input/Output Isolation
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Tape & Reel Version Available

Applications

- Telecommunications
  - Telecom Switching
  - Tip/Ring Circuits
  - Modem Switching (Laptop, Notebook, Pocket Size)
  - Hookswitch
  - Dial Pulsing
  - Ground Start
  - Ringer Injection
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- Medical Equipment-Patient/Equipment Isolation
- Security
- Aerospace
- Industrial Controls

Description

The TS112 Multifunction Telecom switch combines a 350V Form A relay and an optocoupler in a single package. The relay uses optically coupled MOSFET technology to provide 1500V of input to output isolation. The efficient MOSFET switch and photovoltaic die use Clare's patented OptoMOS architecture. The optically coupled input uses highly efficient GaAlAs infrared LEDs. TS112N allows telecom circuit designers to combine two discrete functions, such as hook switch and ring detect, in a single component. The TS112's small package uses less space than traditional discrete component solutions.

Approvals

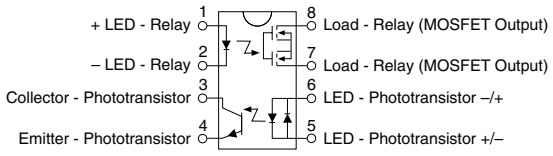
- UL Recognized: File Number Pending
- CSA Certified: File Number Pending
- BSI Certified: Pending

Ordering Information

Part #	Description
TS112N	8 Pin SOIC (50/Tube)
TS112NTR	8 Pin SOIC Tape & Reel (1000/Reel)

Pin Configuration

TS112 Pinout



Absolute Maximum Ratings (@ 25° C)

Parameter	Min	Typ	Max	Units
Input Power Dissipation	-	-	150[1]	mW
Input Control Current Peak (10ms)	- -	- -	100 1	mA A
Reverse Input Voltage	-	-	5	V
Total Power Dissipation	-	-	800[2]	mW
Isolation Voltage Input to Output	1500	-	-	V_{RMS}
Operational Temperature	-40	-	+85	°C
Storage Temperature	-40	-	+125	°C
Soldering Temperature (10 Seconds Max.)			+220	°C

[1] Derate Linearly 1.33 mw/°C

[2] Derate Linearly 6.67 mw/°C

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and effect its reliability.

Electrical Characteristics

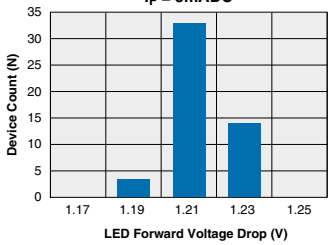
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Relay Portion (Pins 7, 8) Output Characteristics @ 25°C						
Load Voltage (Peak)	-	V_L	-	-	350	V
Load Current (Continuous)	-	I_L	-	-	120	mA
Peak Load Current	10ms	I_{LPK}	-	-	350	mA
On-Resistance	I_L=120mA	R_{ON}	-	15	20	Ω
Off-State Leakage Current	V_L=350V	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=5mA, V_L=10V	T_{ON}	-	-	3	ms
Turn-Off	I_F=5mA, V_L=10V	T_{OFF}	-	-	3	ms
Output Capacitance	50V; f=1MHz	C_{OUT}	-	25	-	pF
Load Current Limit		I_{CL}	-	-	-	mA
Relay Portion (Pins 1, 2) Input Characteristics @ 25°C						
Input Control Current	I_L=120mA	I_F	2	-	50	mA
Input Dropout Current	-	I_F	0.4	0.7	-	mA
Input Voltage Drop	I_F=5mA	V_F	0.9	1.2	1.4	V
Reverse Input Voltage	-	V_R	-	-	5	V
Reverse Input Current	V_R	I_R	-	-	10	µA
Detector Portion (Pins 3, 4) Output Characteristics @ 25°C						
Phototransistor Blocking Voltage	I_C=10µA	BV_{CEO}	20	50	-	V
Phototransistor Output Current	V_{CE}=5V, I_F=0mA	I_{CEO}	-	50	500	nA
Saturation Voltage	I_C=2mA, I_F=16mA	V_{SAT}	-	0.3	0.5	V
Current Transfer Ratio	I_F=6mA, V_{CE}=0.5V	CTR	33	100	-	%

Electrical Characteristics (continued)

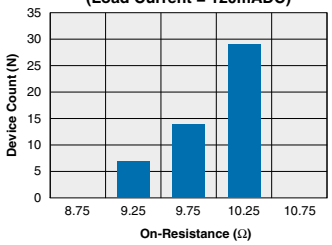
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Detector Portion (Pins 5, 6)						
Input Characteristics @ 25°C						
Input Control Current	I_C=2mA, V_{CE}=0.5V	I_F	6	2	100	mA
Input Voltage Drop	I_F=5mA	V_F	0.9	1.2	1.4	V
Input Current (Detector must be off)	I_C=1µA, V_{CE}=5V	I_F	5	25	-	µA
Input to Output Capacitance (Relay Only)	-	$C_{I/O}$	-	0.8	-	pF
Capacitance Input to Output	-	-	-	3	-	pF
Input to Output Isolation	-	$V_{I/O}$	1500	-	-	V_{RMS}

PERFORMANCE DATA*

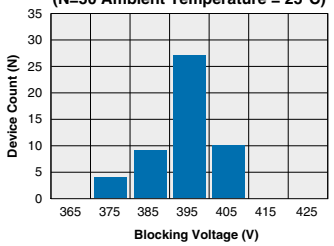
TS112
Typical LED Forward Voltage Drop
(N=50 Ambient Temperature = 25°C)
I_F = 5mADC



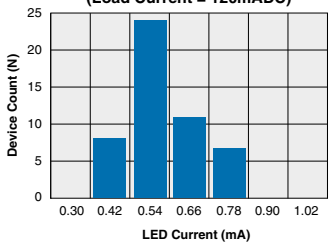
TS112
Typical On-Resistance Distribution
(N=50 Ambient Temperature = 25°C)
(Load Current = 120mADC)



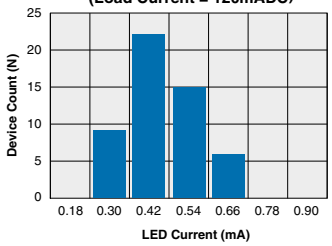
TS112
Typical Blocking Voltage Distribution
(N=50 Ambient Temperature = 25°C)



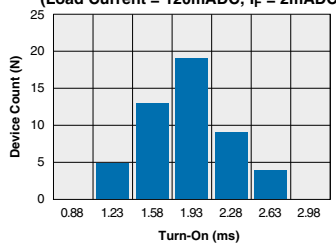
TS112
Typical I_F for Switch Operation
(N=50 Ambient Temperature = 25°C)
(Load Current = 120mADC)



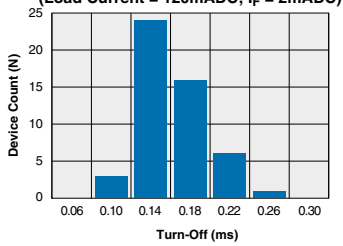
TS112
Typical I_F for Switch Dropout
(N=50 Ambient Temperature = 25°C)
(Load Current = 120mADC)



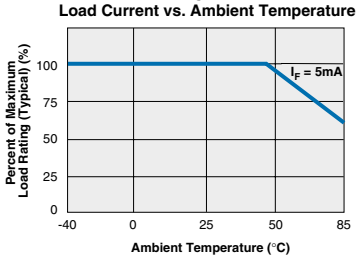
TS112
Typical Turn-On Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 120mADC; I_F = 2mADC)



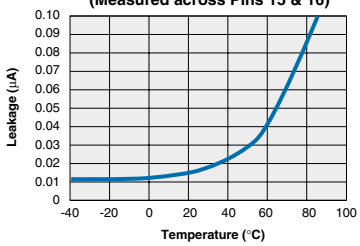
TS112
Typical Turn-Off Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 120mADC; I_F = 2mADC)



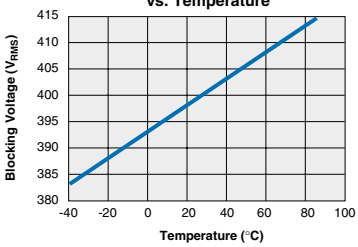
TS112
Load Current vs. Ambient Temperature



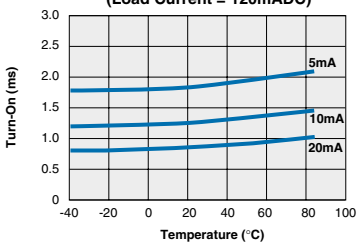
TS112
Typical Leakage vs. Temperature
(Measured across Pins 15 & 16)



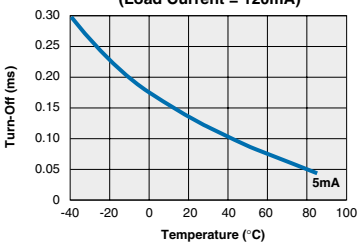
TS112
Typical Blocking Voltage
vs. Temperature



TS112
Typical Turn-On vs. Temperature
(Load Current = 120mADC)



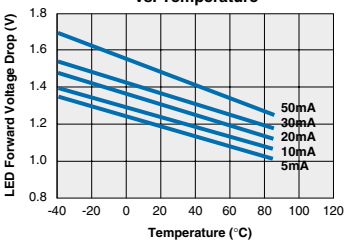
TS112
Typical Turn-Off vs. Temperature
(Load Current = 120mA)



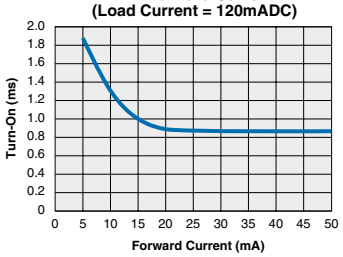
The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

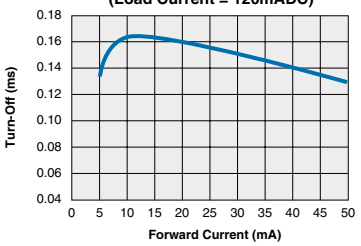
TS112
Typical LED Forward Voltage Drop vs. Temperature



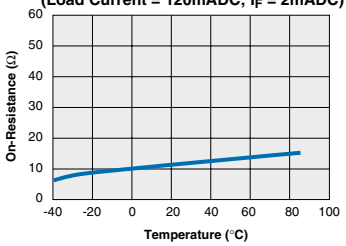
TS112
Typical Turn-On vs. LED Forward Current (Load Current = 120mADC)



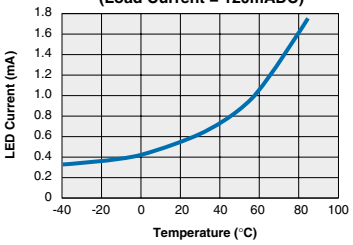
TS112
Typical Turn-Off vs. LED Forward Current (Load Current = 120mADC)



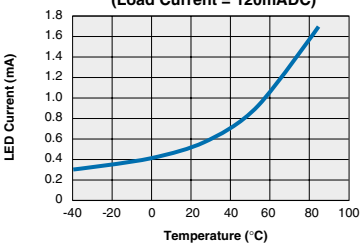
TS112
Typical On-Resistance vs. Temperature (Load Current = 120mADC; I_F = 2mADC)



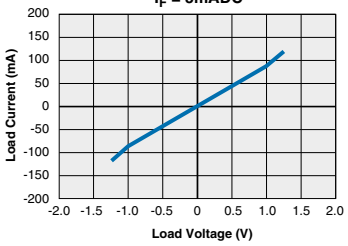
TS112
Typical I_F for Switch Operation vs. Temperature (Load Current = 120mADC)



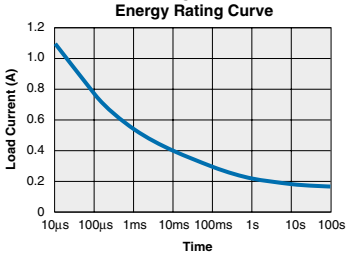
TS112
Typical I_F for Switch Dropout vs. Temperature (Load Current = 120mADC)



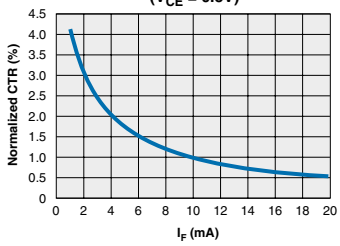
TS112
Typical Load Current vs. Load Voltage (Ambient Temperature = 25°C) I_F = 5mADC



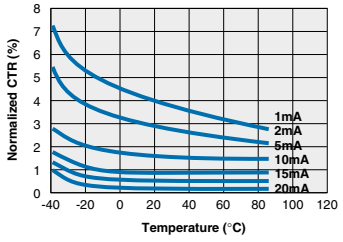
TS112
Energy Rating Curve



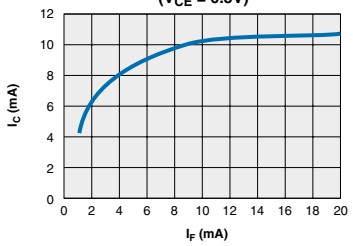
TS112
Typical Normalized CTR vs. Forward Current (V_{CE} = 0.5V)



TS112
Typical Normalized CTR vs. Temperature (V_{CE} = 0.5V)



TS112
Typical Collector Current vs. Forward Current (V_{CE} = 0.5V)



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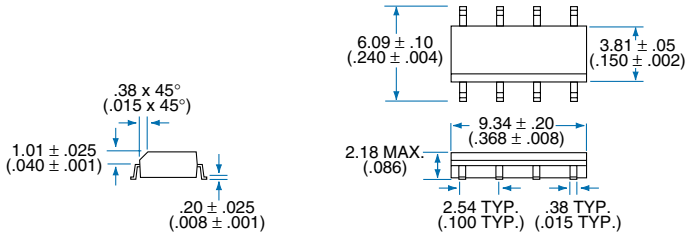
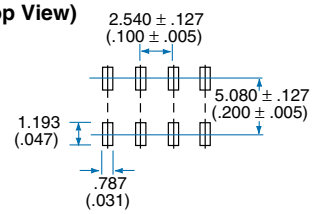
Mechanical Dimensions

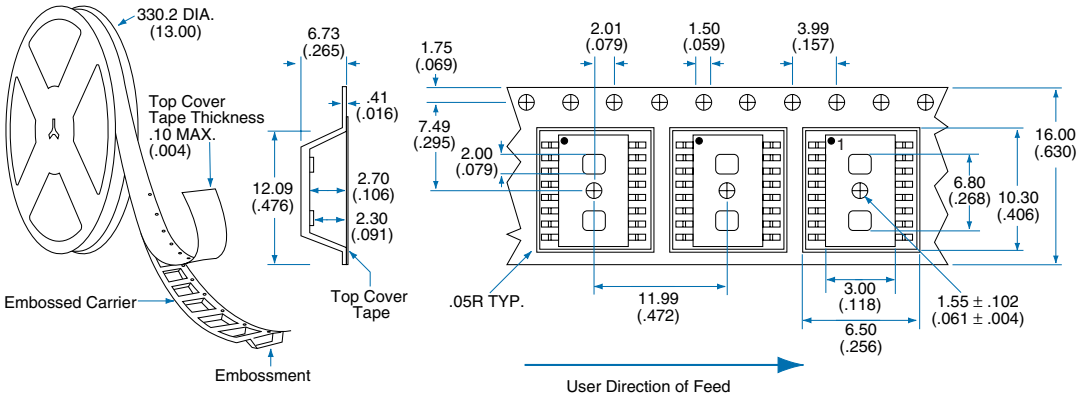
8 Pin SOIC Narrow (“N” Suffix)



PC Board Pattern (Top View)



Tape and Reel Packaging for 8 and 16 Pin Narrow SOIC Package



Dimensions
mm
(inches)

CLARE

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Specification: DS-TS112N-R2

3/22/01