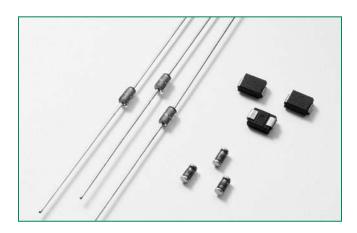


#### RoHS

# **HTxxx & HTMxxx & STxxx Series**



#### **Schematic Symbol**



#### **Applications**

DIACs are used to trigger Triacs and SCRs in phase control circuits for lamp dimming, universal motor speed control, and heat control. They are used also for triggering transistors in solid state ballast lighting controls.

#### **Description**

The HTM, HT, and ST series of bilateral trigger DIACs offer a range of voltage characteristics from 27V to 70V. A DIAC semiconductor is a full-wave or bidirectional Thyristor. It is triggered from a blocking state to a conduction state for either polarity of applied voltage whenever the amplitude of applied voltage exceeds the breakover voltage of the DIAC.

#### **Features & Benefits**

- ROHS compliant
- Bilateral triggering device
- Glass-passivated iunctions
- Wide voltage range selections
- Long-term reliability
- Parameter stability
- Reliable barrier against junction contamination

#### ST Series:

- Epoxy SM package (DO-214)
- High-temperature, solder bonded die attachment

#### HTM/HT Series:

• MINIMELF/DO-35 trigger package

#### **Absolute Maximum Ratings**

Symbol	Parameter	Test Conditions	Min	Max	Unit
1	Pulse On-State Current	120PPS, T <sub>A</sub> ≤ 40°C		2	A
TRM	ruise Off-State Cufferit	pulse width = 10 μS		1.5(*)	
T <sub>s</sub>	Storage Temperature Range		-40	+125	°C
T <sub>J</sub>	Operating Junction Temperature		-40	+125	°C
P <sub>D(AV)</sub>	Device Power Dissipation	$T_A = -40^{\circ}\text{C to } +40^{\circ}\text{C}$		See Product Selector Table	mW

(\*)Only Applies to HT-60

1. Service Dissipation (at  $T_A$  = -40°C to +40°C): 250mW for DO-35 and MINIMELF/SOD-80 and 300mW for DO214

2. Above +40°C, Derate: 3.6mW/°C for DO-35 and MINIMELF/SOD-80 and 3mW/°C for DO214

# Teccor® brand Thyristors Standard Bidirectional DIAC Trigger



#### Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise specified)

Symbol	Description	Test Conditions	Min	Max	Unit
V <sub>BO</sub>	Breakover/Trigger Voltage	50/60Hz Sine Wave	See Product Selector Table	See Product Selector Table	V
$\Delta V_{BO}$	Breakover Voltage Symmetry	$+V_{BO}$ to $-V_{BO}$		2 <sup>(Note 1)</sup>	V
V	Δ Breakback Voltage <sup>(Note 4)</sup>	$V_{BO}$ to $V_{10mA}$	5		V
$V_{BB}$	△ breakback voltage *****	$V_{BO}$ to $V_{6mA}^{(*)}$	15		V
V <sub>BB (DYN)</sub>	Dynamic Δ Breakback Voltage <sup>(Notes 2 &amp; 3)</sup>	120 PPS	10		V
I <sub>BO</sub>	Breakover Current	50/60Hz Sine Wave		15	μА

<sup>(\*)</sup> Only Applies to HT-60

Electrical Characteristic Notes:

Static Characteristics - Not Applicable

#### **Product Selector**

Part Number		Package Availability		$V_{BO}$		
i ait Number	MINIMELF	DO-35	DO-214	MIN	MAX	
XX-32	_	HT-32	ST-32	27V	37V	
XX-32A/ 5761	_	HT-32A	_	28V	36V	
XX-32B/ 5761A	HTM-32B	HT-32B	ST-32B	30V	34V	
XX-34B	_	HT-34B	ST-34B	32V	36V	
XX-35	_	HT-35	ST-35	30V	40V	
XX-36A/ 5762	_	HT-36A	ST-36A	32V	40V	
XX-36B	_	HT-36B	ST-36B	34V	38V	
XX-40	_	HT-40	ST-40	35V	45V	
XX-60	_	HT-60	_	56V	70V	

<sup>&</sup>quot;XX" = HTM for MINIMELF HT for DO-35 ST for DO-214

#### **Thermal Resistances**

Symbol	Description	Test Conditions	Value	Unit	
		Maximum Lead Temperature: 85°C	DO-35	100	°C/W
$R_{\theta(J-L)}$	Junction to Lead	Maximum Lead Temperature: 90°C	DO-214	65*	°C/W
		Maximum Lead Temperature: 87°C	MINIMELF	75	°C/W
$R_{\theta(J-A)}$	Junction to Ambient	Free-Air	DO-35	278	°C/W

<sup>\*</sup> Mounted on 1 cm² copper foil surface; two-ounce copper foil

<sup>1.</sup> Breakover voltage symmetry as close as 1V is available from the factory for these products.

<sup>2.</sup> See Figure 4 and Figure 5 for test circuit and waveforms.

<sup>3.</sup> Typical switching time is 900 nano-seconds measured at  $I_{p_K}$  (Figure 4) across a 20  $\Omega$  resistor (Figure 5). Switching time is defined as rise time of  $I_{p_K}$  between the 10% to 90% points

<sup>4.</sup> See V-I Characteristics



Figure 1: V-I Characteristics

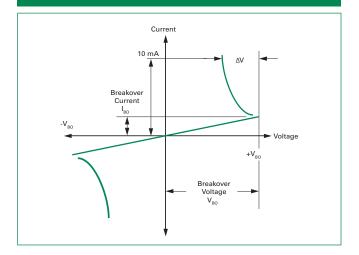


Figure 2: Typical DIAC/Triac Full-wave Phase Control Circuit

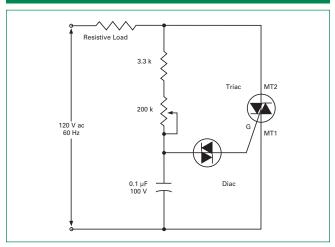


Figure 3: Repetitive Peak On-state Current vs. Pulse Duration

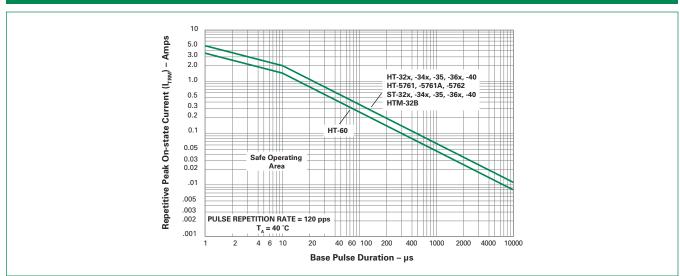


Figure 4: Normalized V<sub>BO</sub> Change vs. Junction Temperature

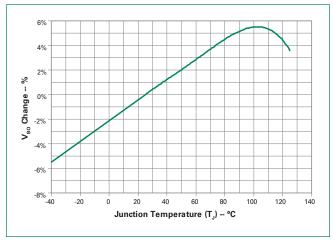
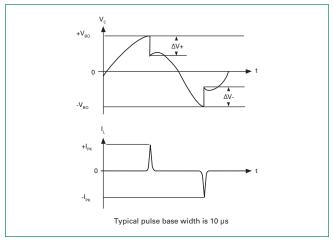


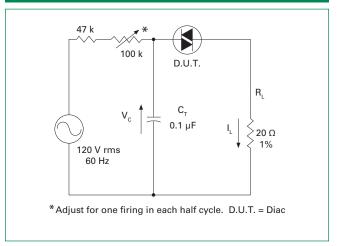
Figure 5: Test Circuit Waveforms (Refer to Figure 5)



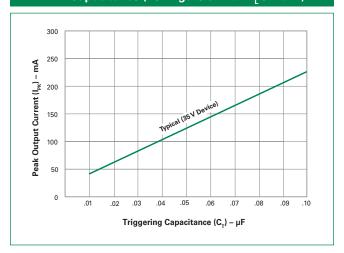
# **Teccor® brand Thyristors** Standard Bidirectional DIAC Trigger



# Figure 6: Circuit Used to Measure DIAC **Characteristics (Refer to Figure 4)**

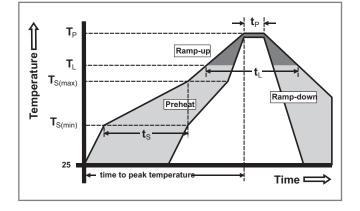


# Figure 7: Peak Output Current vs. Triggering Capacitance (Per Figure 5 with R, of 20 $\Omega$ )



# **Soldering Parameters**

Reflow Co	ndition	Pb – Free assembly	
	-Temperature Min (T <sub>s(min)</sub> )	150°C	
Pre Heat	-Temperature Max (T <sub>s(max)</sub> )	200°C	
	-Time (min to max) (t <sub>s</sub> )	60 – 190 secs	
Average ramp up rate (Liquidus Temp (T <sub>L</sub> ) to peak		5°C/second max	
T <sub>S(max)</sub> to T <sub>L</sub> - Ramp-up Rate		5°C/second max	
Reflow	-Temperature (T <sub>L</sub> ) (Liquidus)	217°C	
nellow	-Time (min to max) (t <sub>s</sub> )	60 – 150 seconds	
PeakTemp	erature (T <sub>P</sub> )	260 °C	
Time within 5°C of actual peak Temperature (t <sub>p</sub> )		20 - 40 seconds	
Ramp-dov	vn Rate	5°C/second max	
Time 25°C	to peakTemperature (T <sub>P</sub> )	8 minutes Max.	
Do not exc	ceed	280°C	





# **Physical Specifications**

Terminal Finish	100% Matte-Tin Plated/ Pb-Free Solder Dipped
Body Material	DO-214: UL recognized epoxy meeting flammabilty classification 94V-0. DO-35/MINIMELF: Glass case body
Lead Material	DO-214: Copper Alloy DO-35/MINIMELF: Copper Clad Iron

#### **Design Considerations**

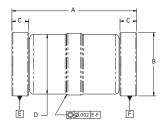
Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Overheating and surge currents are the main killers of DIACs. Correct mounting, soldering, and forming of the leads also help protect against component damage.

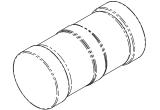
# Reliability/Environmental Tests

**Teccor® brand Thyristors** Standard Bidirectional DIAC Trigger

Test	Specifications and Conditions
High Temperature Voltage Blocking	MIL-STD-750, M-1040, Cond A Applied 80% of Rated Min V <sub>BO</sub> (VAC-peak) @ 125°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time
Temperature/ Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 80% of Rated Min $V_{\rm BO}$ ( $V_{\rm DC}$ ): 85°C; 85% rel humidity
High Temp Storage	MIL-STD-750, M-1031,1008 hours; 150°C
Low-Temp Storage	1008 hours; -40°C
Thermal Shock	MIL-STD-750, M-1056 10 cycles; 0°C to 100°C; 5-min dwell time at each temperature; 10 sec (max) transfer time between temperature
Autoclave	EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H
Resistance to Solder Heat	MIL-STD-750 Method 2031
Solderability	ANSI/J-STD-002, category 3, Test A
Lead Bend	MIL-STD-750, M-2036 Cond E
Burn-in	1 firing per 1/2 cycle, 168 hours

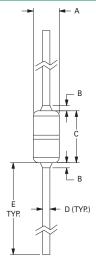
# Dimensions - MINIMELF / SOD-80 (MM Package)





Dimonolono		Inches		Millimeters		rs
Dimensions	Min	Тур	Max	Min	Тур	Max
А	0.125	0.134	0.142	3.18	3.40	3.61
В	0.066	0.068	0.070	1.68	1.73	1.78
С	0.012	0.018	0.020	0.30	0.46	0.51
D	_	0.063	_	_	1.60	_

#### **Dimensions – DO-35 (Y Package)**



Dimension	Inc	hes	Millin	neters	
Difficusion	Min	Max	Min	Max	
A (Note 1)	0.060	0.090	1.530	2.280	
B (Note 2)		0.015		0.381	
C (Note 1)	0.135	0.165	3.430	4.190	
D	0.018	0.022	0.458	0.558	
Е	1.000		25.400		

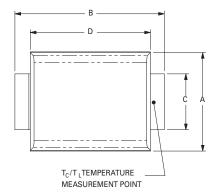
#### Notes

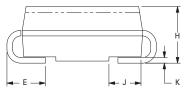
- Package contour optional within dimensions A and C. Slugs, if any, shall be included within this cylinger but shall not be subject to the minimum limit of Dimention A.
- Lead diameter is not controlled in this zone to allow for flash, lead finish build-up and minor irregularities other than slugs.

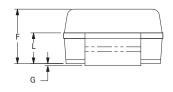
# **Teccor® brand Thyristors** Standard Bidirectional DIAC Trigger



# **Dimensions – DO-214 (S Package)**







	2.80 (.110")	
2.00	2.00 (.079")	

Recommended Soldering Pad Outline (Reference Only)

Dimension	Inc	hes	Millin	neters
Dimension	Min	Max	Min	Max
А	0.140	0.155	3.56	3.94
В	0.205	0.220	5.21	5.59
С	0.077	0.083	1.96	2.11
D	0.166	0.180	4.22	4.57
Е	0.036	0.063	0.91	1.60
F	0.066	0.083	1.67	2.11
G	0.004	0.008	0.10	0.20
Н	0.077	0.086	1.96	2.18
J	0.043	0.053	1.09	1.35
K	0.008	0.012	0.20	0.30
L	0.039	0.049	0.99	1.24

# **Packing Options**

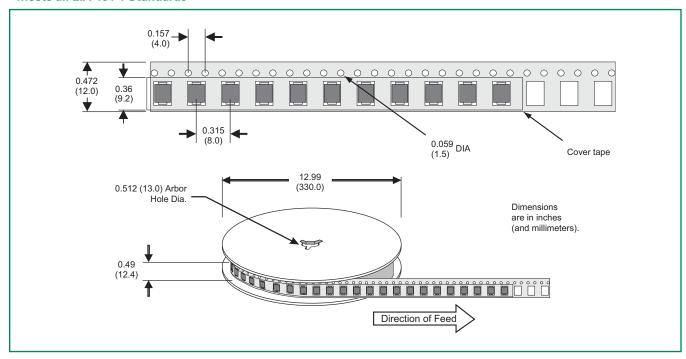
Part	Marking	Package	Weight/	Packing	Base	Qua	ntity
Number	iviarking	rackaye	Unit	Mode	Node Quantity	Reel	Box
HTM-xxxRP	_	MINIMELF	0.040g	Tape & Reel	5000	2500	_
HT-xxxRP	_	DO35	0.150g	Tape & Reel	5000	5000	_
HT-xxx	_	DO35	0.150g	Bulk	5000	_	5000
ST-xxxRP	STxxx	DO214	0.075g	Tape & Reel	2500	2500	_

Revised: July 9, 2008



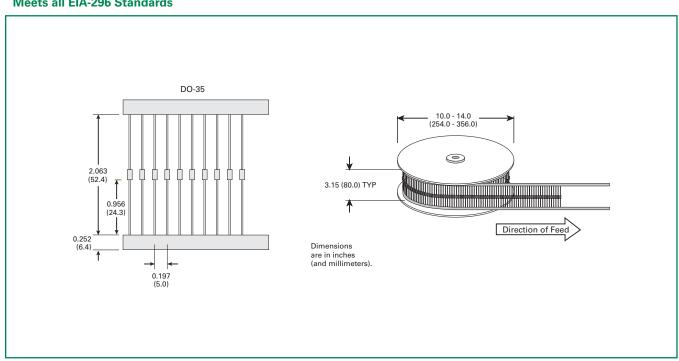
# **DO-214 Embossed Carrier Reel Pack (RP) Specifications**

#### Meets all EIA-481-1 Standards



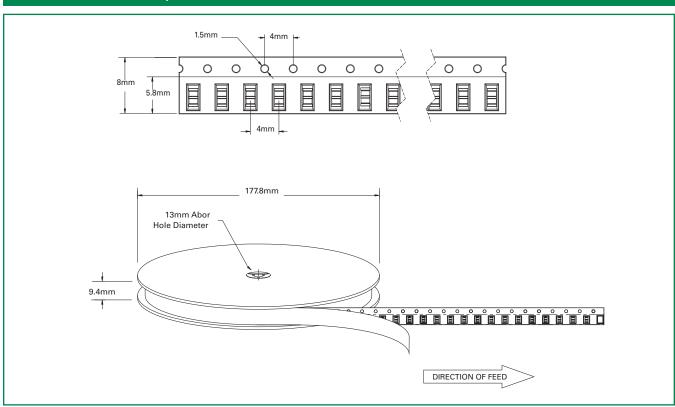
# DO-35 Reel Pack (RP) Specifications

#### Meets all EIA-296 Standards

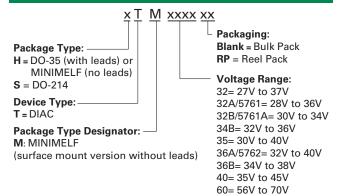




# **MINIMELF Reel Pack (RP) Specifications**



# **Part Numbering System**



# **Part Marking System**

DO-35 & MINIMELF: No marking

DO-214: 555 F S

First Line: Part Number Second Line: Date Code