M54531P

7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

The M54531P, 7-channel sink driver, consists of 14 NPN transistors connected to form high current gain driver pairs.

FEATURES

- High output sustaining voltage to 40V
- High output sink current to 400mA
- Integral diodes for transient suppression
- PMOS compatible input
- Wide input voltage range from −40V to +40V
- Wide operating temperature range (T_a = −20~+75℃)

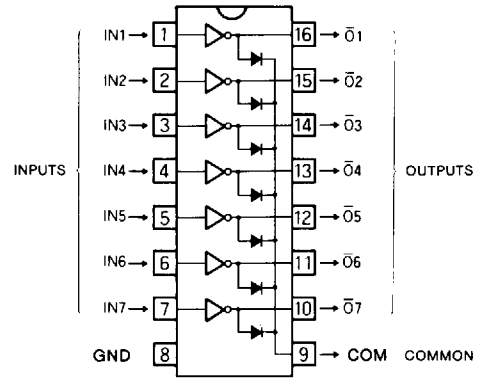
APPLICATION

Relay and printer driver, LED and incandescent display digit driver, Interfacing for standard MOS/BIPOLAR logics

FUNCTION

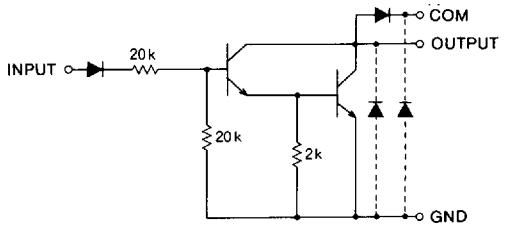
The M54531P is comprised of seven NPN darlington driver pairs. Each input has a diode and 20kΩ resistor in series to allow a negative voltage input. Between pin 9 and each out, there are integral diodes for inductive load transient suppression. All emitters and the substrate are connected together to pin 8 . The outputs are capable of sinking 400mA and will withstand 40V in the OFF state.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

CIRCUIT SCHEMATIC



The diodes shown by broken line are parasite diodes and must not be used

Unit : Ω

ABSOLUTE MAXIMUM RATINGS (T_a=−20~+75℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CEO}	Output sustaining voltage	Transistor OFF	−0.5~+40	V
I_C	Collector current per channel	Transistor ON	400	mA
V_I	Input voltage		−40~+40	V
$I_{F(D)}$	Clamp diode forward current		400	mA
$V_{R(D)}$	Clamp diode reverse voltage		40	V
P_d	Power dissipation	T_a=25℃	1.47	W
Topr	Operating temperature		−20~+75	℃
Tstg	Storage temperature		−55~+125	℃

MITSUBISHI ELECTRIC

7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

RECOMMENDED OPERATIONAL CONDITIONS (T_a=−20~+75℃, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		0		40	V
I_C	Collector current per channel	Percent duty cycle less than 8%	0		400	mA
		Percent duty cycle less than 30%	0		200	
V_{IH}	"H" Input voltage	I_C=400mA	9		35	V
		I_C=200mA	6		35	
V_{IL}	"L" Input voltage	$I_{C(leak)}$=50μA	0		1	V

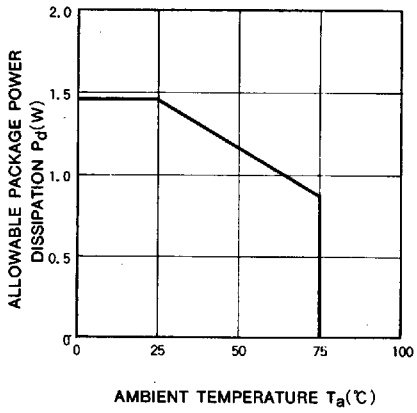
ELECTRICAL CHARACTERISTICS (T_a=−20~+75℃, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ*	Max	
$V_{(BR)CEO}$	Output sustaining voltage	I_{CEO}=100μA	40			V
$V_{CE(sat)}$	Output saturation voltage	V_I=9V, I_C=400mA		1.3	2.4	V
		V_I=6V, I_C=200mA		1	1.6	
I_I	Input current	V_I=18V		0.85	1.8	mA
		V_I=35V		2.0	3.8	
I_R	Input leakage current	V_I=−35V			−20	μA
$V_{F(D)}$	Clamp diode forward voltage	$I_{F(D)}$=400mA		1.5	2.4	V
$V_{R(D)}$	Clamp diode reverse voltage	$I_{R(D)}$=100μA	40			V
h_{FE}	DC forward current gain	V_{CE}=4V, I_C=300mA, T_a=25℃	1000	3500		—

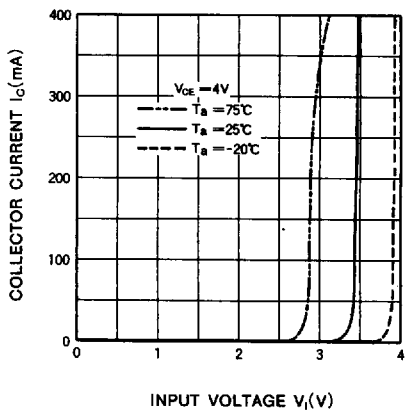
* : Typical values are at T_a=25℃.

TYPICAL CHARACTERISTICS

ALLOWABLE AVERAGE POWER DISSIPATION

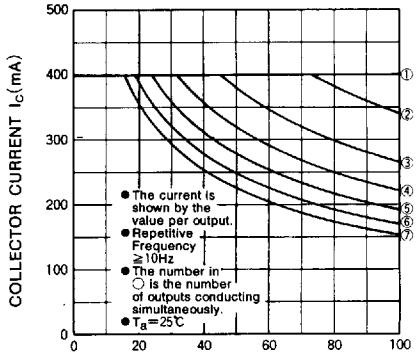


OUTPUT CURRENT CHARACTERISTICS



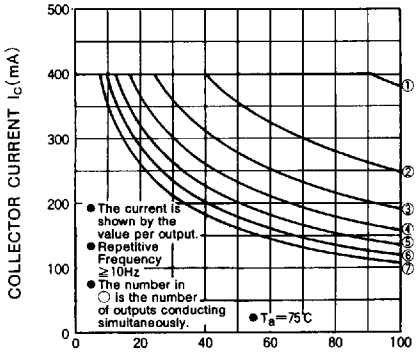
7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE



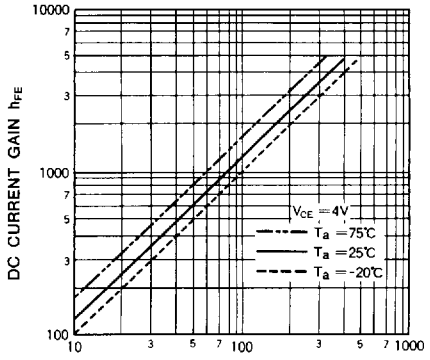
DUTY CYCLE (%)

ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE



DUTY CYCLE (%)

DC CURRENT GAIN CHARACTERISTICS



COLLECTOR CURRENT I_C(mA)

MITSUBISHI ELECTRIC