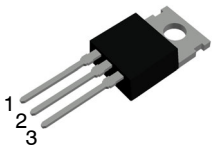
Bipolar Transistor

50 V, 5 A, Low $V_{CE(sat)}$, NPN TO−220−3L

2SD1060



1. Base
2. Collector
3. Emitter

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Features

- Low Collector−to−Emitter Saturation Voltage : $V_{CE(sat)}$ = 0.3 V max / I_C = 3 A, I_B = 0.3 A

Applications

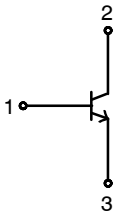
- Suitable for Relay Drivers, High−Speed Inverters, Converters, and Other General Large−Current Switching

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

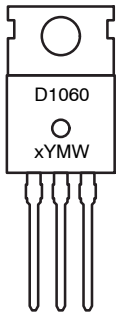
Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector−to−Base Voltage	−	60	V
V_{CEO}	Collector−to−Emitter Voltage	−	50	V
V_{EBO}	Emitter−to−Base Voltage	−	6	V
I_C	Collector Current	−	5	A
I_{CP}	Collector Current (Pulse)	−	9	A
P_C	Collector Dissipation	−	1.75	W
		T_C = 25°C	30	W
Tj	Junction Temperature	−	150	°C
Tstg	Storage Temperature	−	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ELECTRICAL CONNECTION



MARKING DIAGRAM



D1060x	= Specific Device Code
x	= S/R
Y	= Year of Production
M	= Assembly Operation Month
W	= Work Week Number

ORDERING INFORMATION

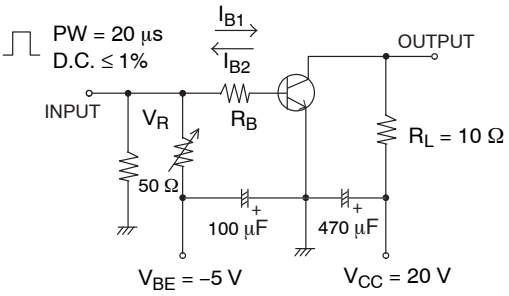
Device	Package	Shipping
2SD1060R−1E	TO−220−3L (Pb−Free)	50 Units / Tube
2SD1060S−1E	TO−220−3L (Pb−Free)	50 Units / Tube

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Conditions	Ratings			Unit
			Min	Typ	Max	
I_{CBO}	Collector Cutoff Current	V_{CB} = 40 V, I_E = 0 A	–	–	0.1	mA
I_{EBO}	Emitter Cutoff Current	V_{EB} = 4 V, I_C = 0 A	–	–	0.1	mA
$h_{FE}1$	DC Current Gain	V_{CE} = 2 V, I_C = 1 A	100*	–	280*	
$h_{FE}2$		V_{CE} = 2 V, I_C = 2 A	80	–	–	
f_T	Gain−Bandwidth Product	V_{CE} = 5 V, I_C = 1 A	–	30	–	MHz
Cob	Output Capacitance	V_{CB} = 10 V, f = 1 MHz	–	100	–	pF
$V_{CE(sat)}$	Collector−to−Emitter Saturation Voltage	I_C = 3 A, I_B = 0.3 A	–	–	0.3	V
$V_{(BR)CBO}$	Collector−to−Base Breakdown Voltage	I_C = 1 mA, I_E = 0 A	60	–	–	V
$V_{(BR)CEO}$	Collector−to−Emitter Breakdown Voltage	I_C = 1 mA, R_{BE} = ∞	50	–	–	V
$V_{(BR)EBO}$	Emitter−to−Base Breakdown Voltage	I_E = 1 mA, I_C = 0 A	6	–	–	V
t_{on}	Turn−ON Time	See specified Test Circuit	–	0.1	–	μs
t_{stg}	Storage Time		–	1.4	–	μs
t_f	Fall Time		–	0.2	–	μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
* The 2SD1060 is classified by 1 A h_{FE} as follows:

Rank	R	S
h_{FE}	100 to 200	140 to 280



$I_C = 10I_{B1} = -10I_{B2}$ = 2 A

Figure 1. Switching Time Test Circuit

TYPICAL CHARACTERISTICS

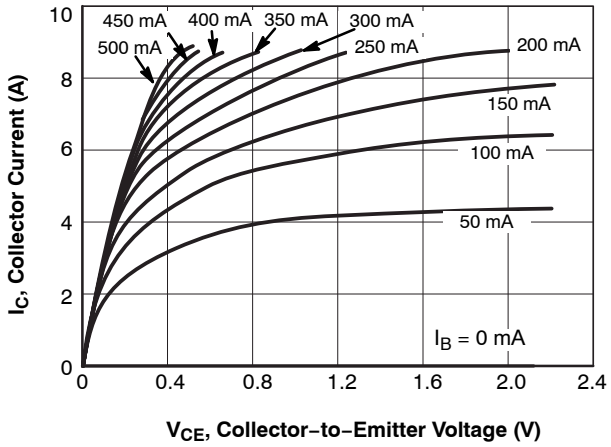


Figure 2. $I_C - V_{CE}$

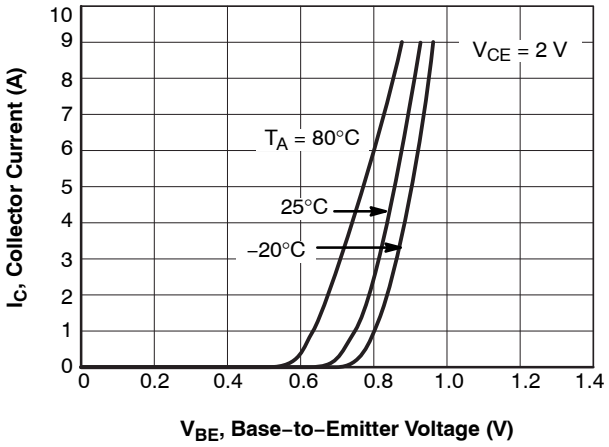


Figure 3. $I_C - V_{BE}$

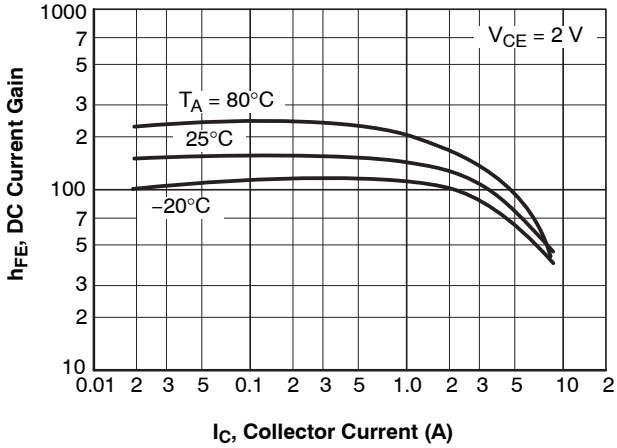


Figure 4. $h_{FE} - I_C$

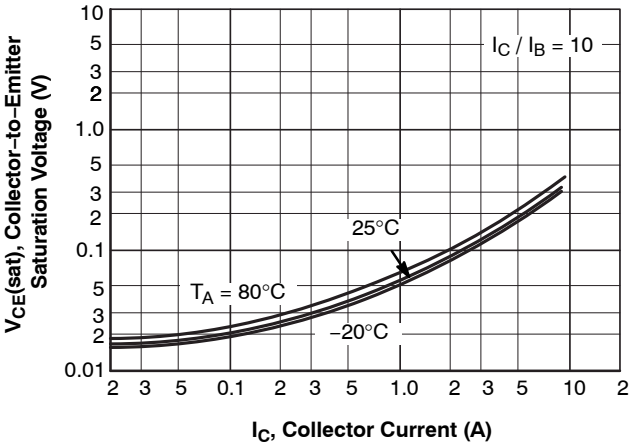


Figure 5. V_{CE}(sat) − I_C

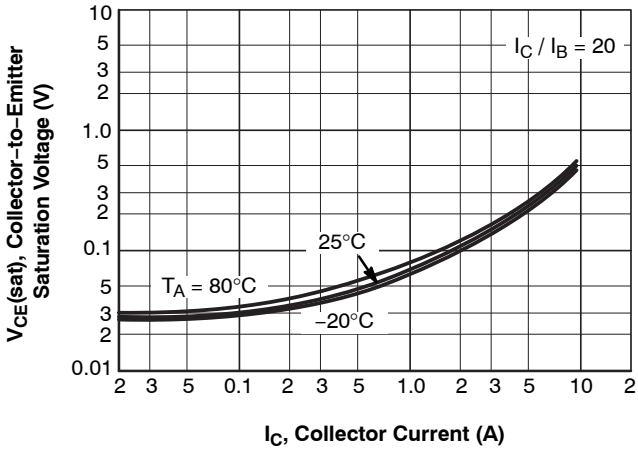


Figure 6. V_{CE}(sat) − I_C

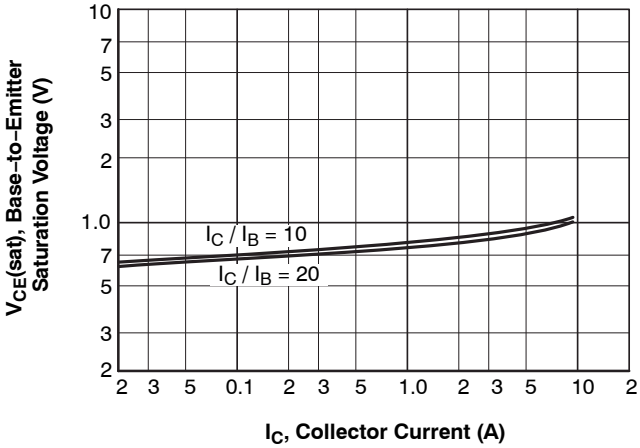


Figure 7. V_{BE}(sat) − I_C

TYPICAL CHARACTERISTICS (continued)

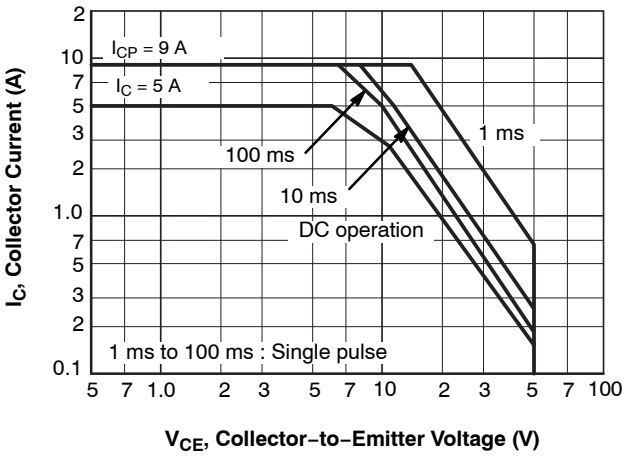


Figure 8. ASO

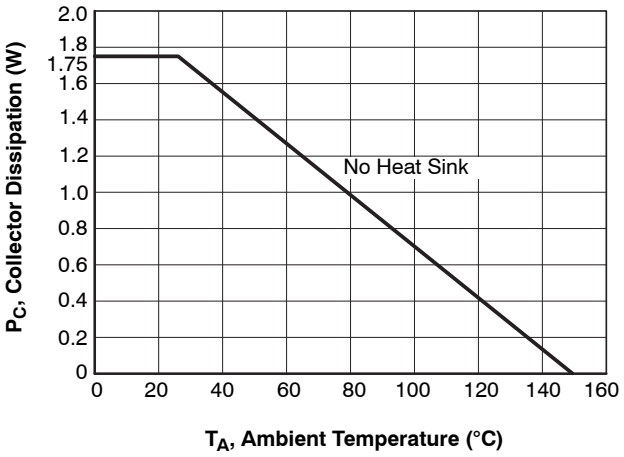


Figure 9. P_C – T_A

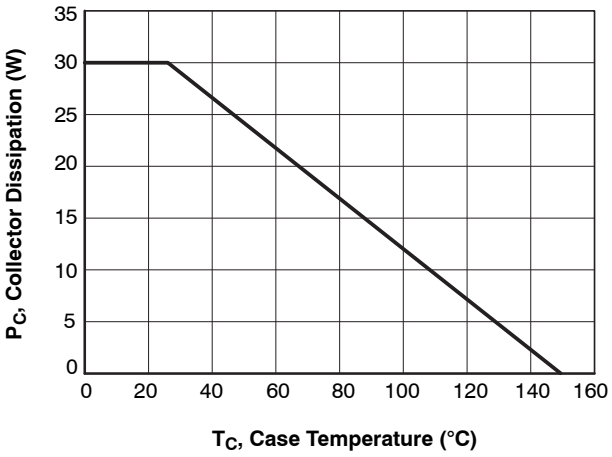
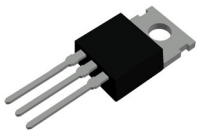


Figure 10. P_C – T_C



TO−220, 3L, 10.00x9.20x4.50, 2.45P
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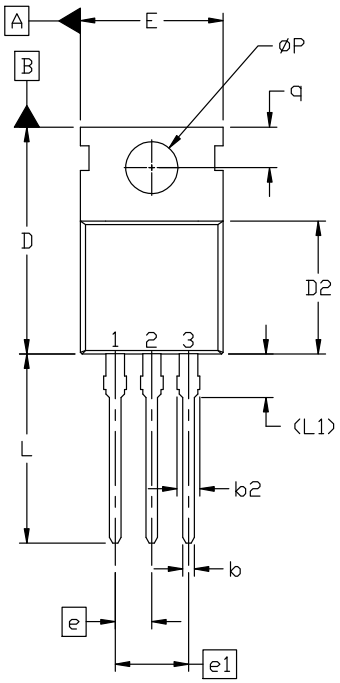
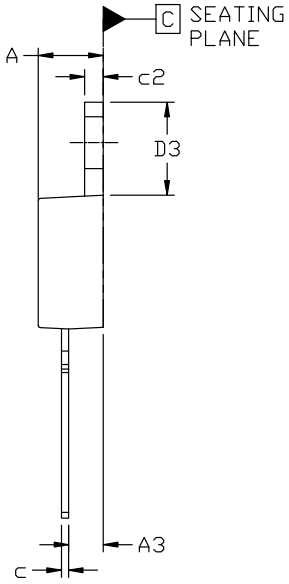
ISSUE B

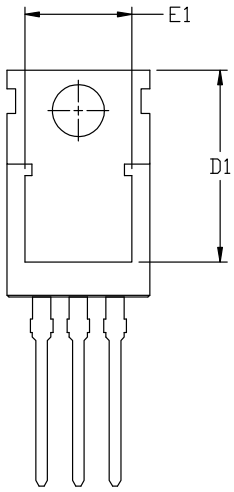
DATE 18 JAN 2024



TOP VIEW



SIDE VIEW



BOTTOM VIEW

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.30	4.50	4.70
A3	2.20	2.40	2.60
b	0.70	0.80	0.90
b2	1.17	1.27	1.37
c	0.45	0.50	0.60
c2	1.20	1.30	1.40
D	15.50	15.70	15.90
D1	13.10	13.30	13.50
D2	9.00	9.20	9.40
D3	6.30	6.50	6.70
E	9.80	10.00	10.20
E1	---	---	8.90
e	2.54 BSC		
e1	5.08 BSC		
L	12.88	13.08	13.28
L1	2.80	3.00	3.20
øP	3.40	3.60	3.80
q	2.70	2.80	2.90

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
4. MAXIMUM WIDTH FOR F102 DEVICES = 1.37MM.
5. DIMENSION "A3" TO BE MEASURED IN THE REGION DEFINED BY L1.

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DESCRIPTION:	**TO−220, 3L, 10.00x9.20x4.50, 2.45P**	**PAGE 1 OF 1**

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