NEC

SILICON POWER TRANSISTOR
2SD2161

NPN SILICON EPITAXIAL TRANSISTOR (DARLINGTON CONNECTION) FOR LOW-FREQUENCY POWER AMPLIFIERS AND LOW-SPEED SWITCHING

The 2SD2161 is a Darlington power transistor that can directly drive from the IC output. This transistor is ideal for motor drivers and solenoid drivers in such as OA and FA equipment.

In addition, a small resin-molded insulation type package contributes to high-density mounting and reduction of mounting cost.

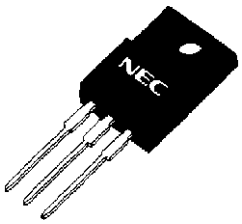
FEATURES

- High h_{FE} due to Darlington connection
  $h_{FE} \geq 2{,}000$ (V_{CE} = 2.0 V, I_C = 2.0 A)
- Full mold package that does not require an insulating board or insulation bushing

ORDERING INFORMATION

Ordering Name	Package
2SD2161	Isolated TO-220

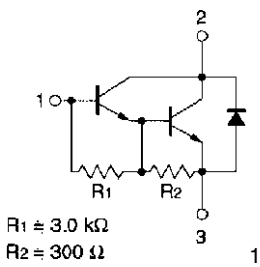
(Isolated TO-220)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Conditions	Ratings	Unit
Collector to base voltage	V_{CBO}		100	V
Collector to emitter voltage	V_{CEO}		100	V
Emitter to base voltage	V_{EBO}		7.0	V
Collector current (DC)	$I_{C(DC)}$		±5.0	A
Collector current (pulse)	$I_{C(pulse)}$	PW ≤ 300 μs, duty cycle ≤ 10%	±10	A
Base current (DC)	$I_{B(DC)}$		0.5	A
Total power dissipation	P_T	T_C = 25°C	20	W
		T_A = 25°C	2.0	W
Junction temperature	T_j		150	°C
Storage temperature	T_{stg}		−55 to +150	°C

INTERNAL EQUIVALENT CIRCUIT



R1 ≒ 3.0 kΩ
R2 ≒ 300 Ω

1. Base
2. Collector
3. Emitter

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Document No. D14864EJ2V0DS00 (2nd edition)
Date Published April 2002 N CP(K)
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

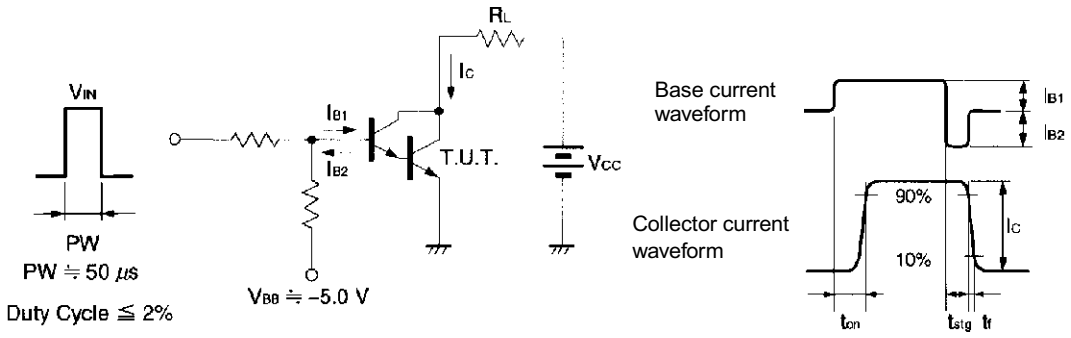
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 100 V, I_E = 0 A			1.0	μA
DC current gain	h_{FE1}	V_{CE} = 2.0 V, I_C = 2.0 A[Note]	2,000	8,000	20,000	
	h_{FE2}	V_{CE} = 2.0 V, I_C = 4.0 A[Note]	500			
Collector saturation voltage	$V_{CE(sat)}$	I_C = 2.0 A, I_B = 2.0 mA[Note]			1.5	V
Base saturation voltage	$V_{BE(sat)}$	I_C = 2.0 A, I_B = 2.0 mA[Note]			2.0	V
Gain bandwidth product	f_T	V_{CE} = 5.0 V, I_C = 0.5 A		30		MHz
Collector capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0 A, f = 1.0 MHz		35		pF
Turn-on time	t_{on}	I_C = 2.0 A, R_L = 25 Ω, I_{B1} = −I_{B2} = 2.0 mA, V_{CC} ≅ 50 V Refer to the test circuit.		1.0		μs
Storage time	t_{stg}			3.5		μs
Fall time	t_f			1.2		μs

Note Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

h_{FE} CLASSIFICATION

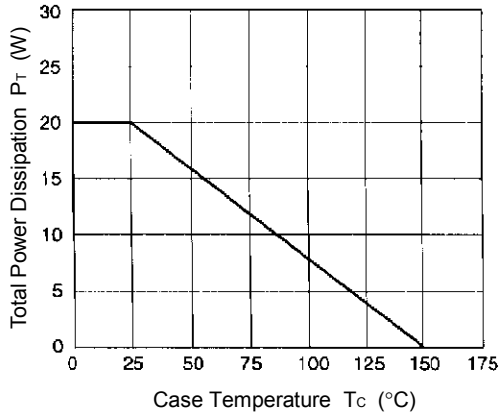
Marking	M	L	K
h_{FE1}	2,000 to 5,000	4,000 to 10,000	8,000 to 20,000

SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT

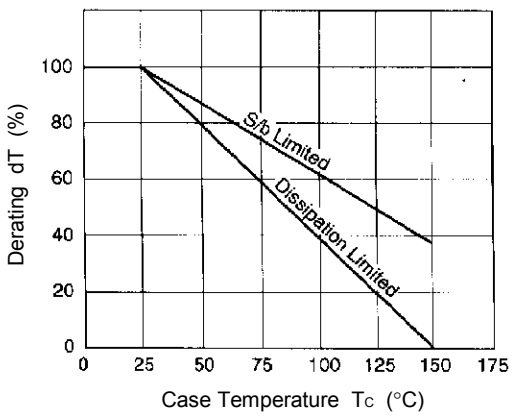


TYPICAL CHARACTERISTICS (T_A = 25°C)

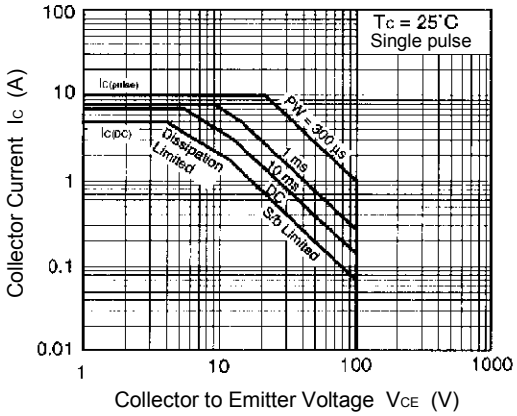
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



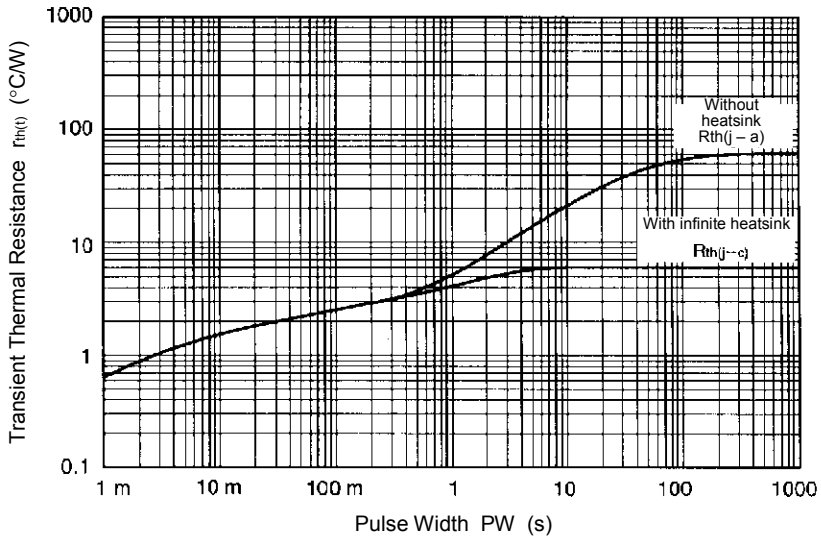
DERATING CURVE OF SAFE OPERATING AREA



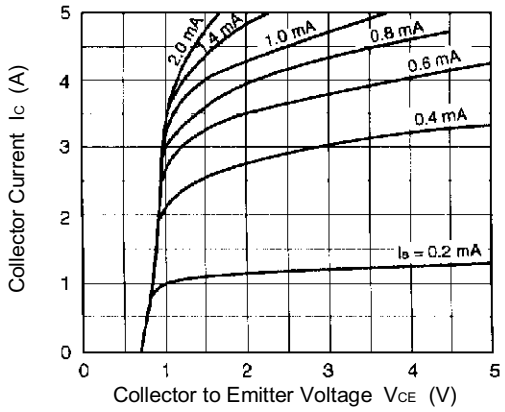
FORWARD BIAS SAFE OPERATING AREA



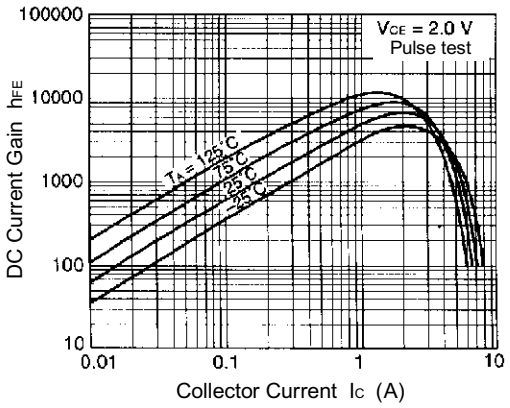
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



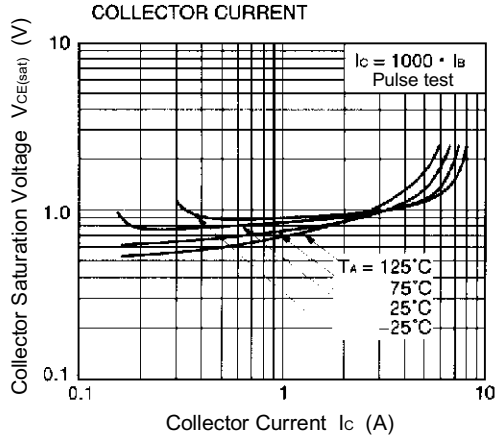
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



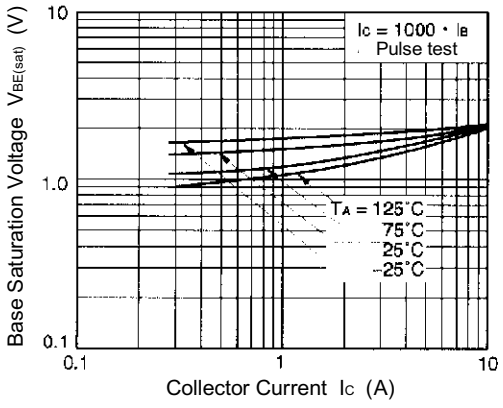
DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT

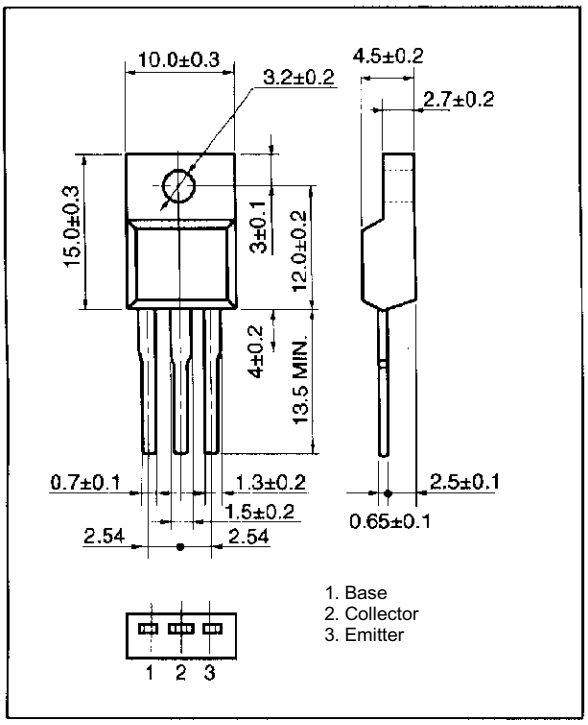


BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



PACKAGE DRAWING (UNIT: mm)

Isolated TO-220 (MP-45F)



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