

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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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

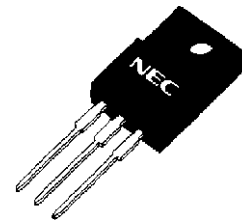
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

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)	$I_{C(pulse)}$	$PW \leq 300 \mu s$, duty cycle $\leq 10\%$	± 10	A
Base current (DC)	$I_{B(DC)}$		0.5	A
Total power dissipation	P_T	$T_C = 25^\circ\text{C}$	20	W
		$T_A = 25^\circ\text{C}$	2.0	W
Junction temperature	T_j		150	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to $+150$	$^\circ\text{C}$

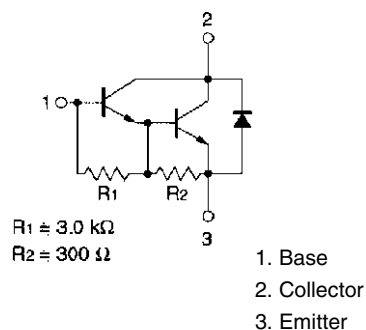
ORDERING INFORMATION

Ordering Name	Package
2SD2161	Isolated TO-220

(Isolated TO-220)



INTERNAL EQUIVALENT CIRCUIT



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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

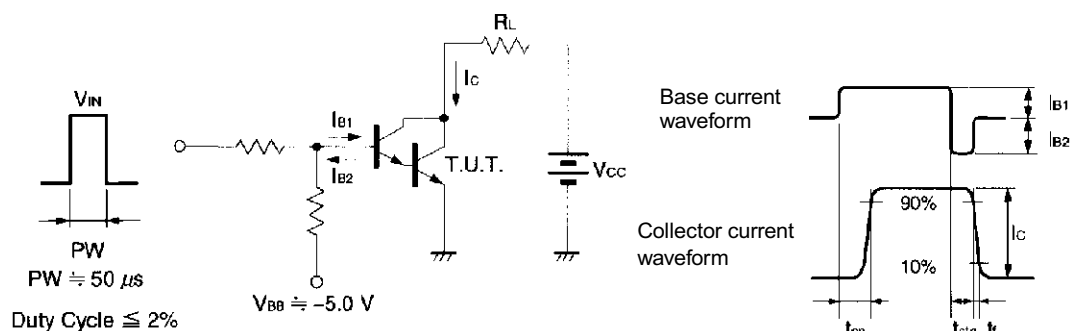
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 100 V, I _E = 0 A			1.0	μA
DC current gain	h _{FE1}	V _{CE} = 2.0 V, I _C = 2.0 A ^{Note}	2,000	8,000	20,000	
	h _{FE2}	V _{CE} = 2.0 V, I _C = 4.0 A ^{Note}	500			
Collector saturation voltage	V _{CE(sat)}	I _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%

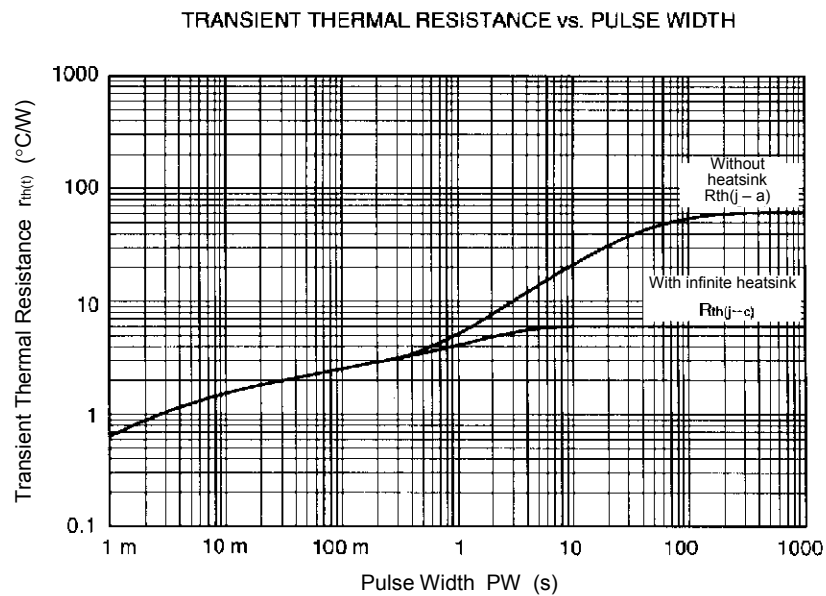
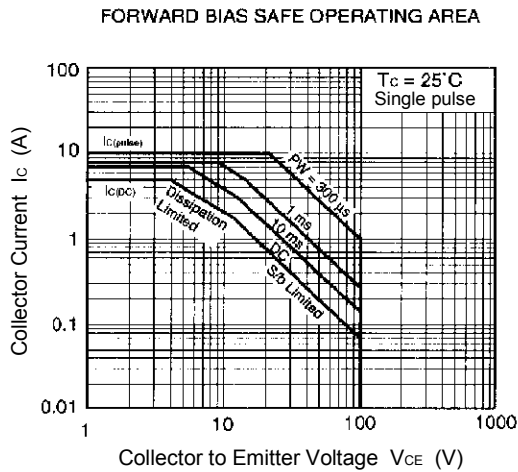
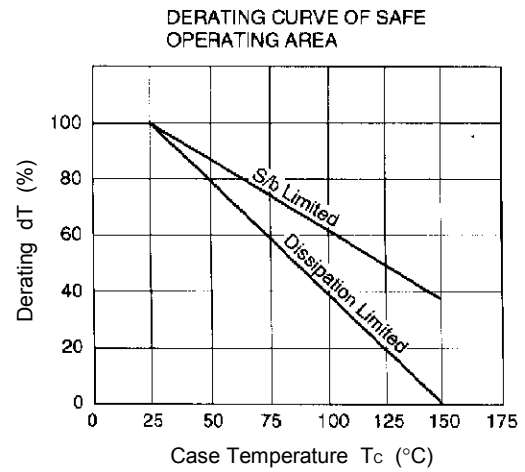
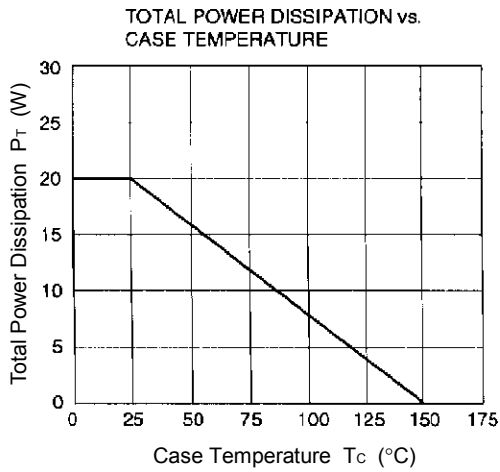
h_{FE} CLASSIFICATION

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

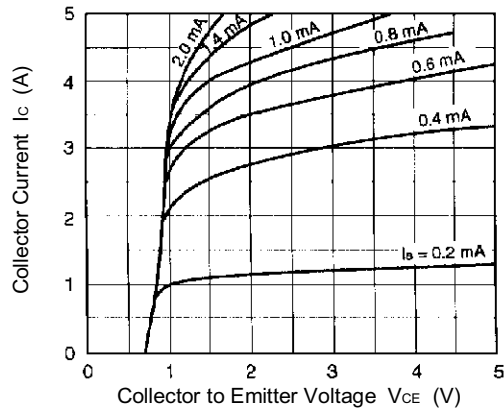
SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT



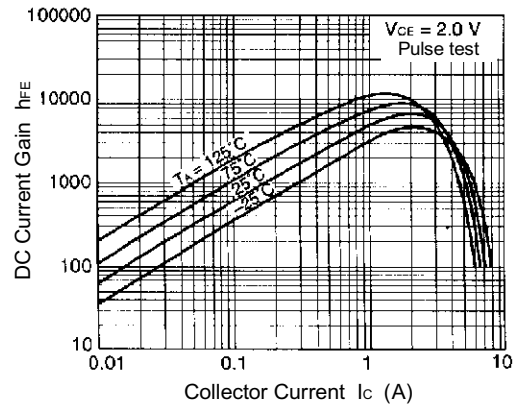
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



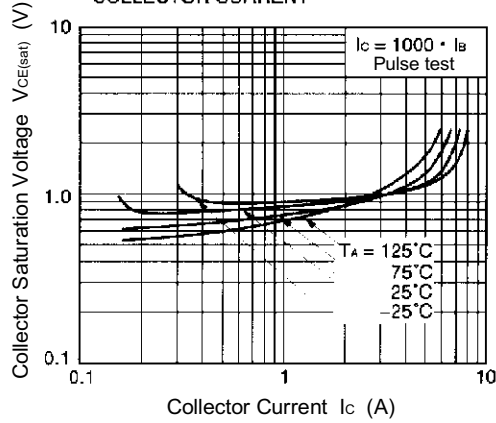
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



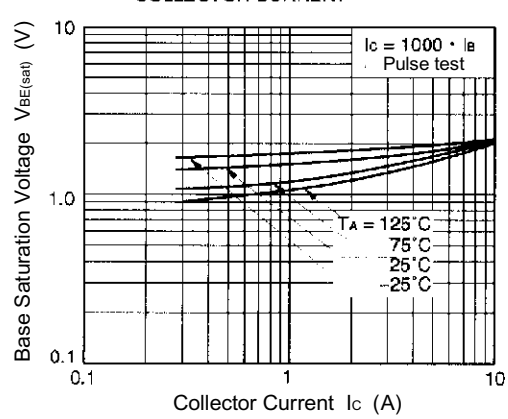
DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT

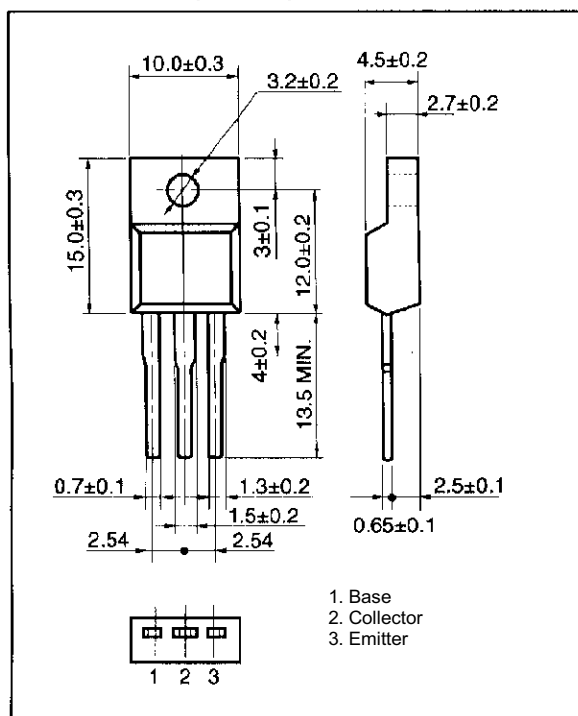


BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



PACKAGE DRAWING (UNIT: mm)

Isolated TO-220 (MP-45F)



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