New Jersey Semi-Conductor Products, Inc.

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GSRU20030
GSRU20035
GSRU20040

NPN
300, 350, 400V
20 AMP SWITCHING
t_f — 100ns TYPICAL

- **High Speed**
- **Rugged**
- **Cost Effective**
- **Off-line Power Supplies**
- **Switching Amplifiers**
- **Inverters/Converters**
- **Motor Speed Control Circuits**
- **Switching Regulators**
- **Solenoid & Relay Drivers**

TO-204AA (TO-3)

MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

RATING	SYMBOL	GSRU20030	GSRU20035	GSRU20040	UNIT
Collector-Base Voltage	V_{CBO}	400	450	500	Volts
Collector-Emitter Voltage	V_{CEO}	300	350	400	Volts
Emitter-Base Voltage	V_{EBO}	8.0	8.0	8.0	Volts
Collector Current—Continuous Peak	I_C I_{CM}	25 30	25 30	25 30	Amps Amps
Base Current—Continuous	I_B	10	10	10	Amps
Total Power Dissipation @ T_C = 25° C	P_D	200	200	200	Watts
Θ_{J-C}, Junction to Case Thermal Resistance	$R_{\Theta JC}$	.875	.875	.875	°C/W
Operating and Storage Junction Temperature Range	$T_{J(oper)}$ T_{stg}	-65 to +200	-65 to +200	-65 to +200	°C

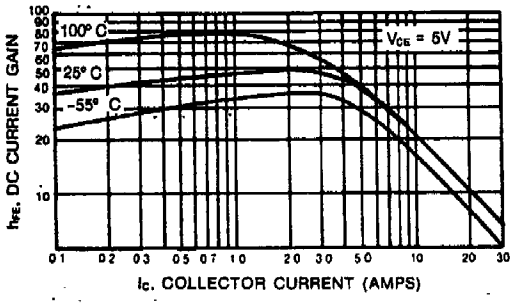
ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

SYMBOL	CONDITIONS	GSRU20030		GSRU20035		GSRU20040		Unit
		Min	Max	Min	Max	Min	Max	
V_{CBO}	I_C = 1.0mA	400	—	450	—	500	—	Volts
V_{CEO}	I_D = 50mA	300	—	350	—	400	—	Volts
V_{EBO}	I_E = 1.0mA	8.0	—	8.0	—	8.0	—	Volts
I_{CBO}	V_{CB} = 80% of Rated V_{CBO}	—	100	—	100	—	100	μA
I_{EBO}	V_{EB} = 5.0V	—	10	—	10	—	10	μA
h_{FE}†	V_{CE} = 5.0V, I_C = 20A	8.0	—	8.0	—	8.0	—	—
$V_{CE(sat)}$†	I_C = 20A, I_B = 4.0A	—	1.5	—	1.5	—	1.5	Volts
$V_{BE(sat)}$†	I_C = 20A, I_B = 4.0A	—	1.6	—	1.6	—	1.6	Volts
f_T	V_{CE} = 10V, I_C = 1.0A, f = 10MHz	20	—	20	—	20	—	MHz
C_{obo}	V_{CB} = 10V, f = 1.0MHz	—	500	—	500	—	500	pF
SWITCHING		**Typ**	**Max**	**Typ**	**Max**	**Typ**	**Max**	**Unit**
t_d	**Resistive Load** V_{CC} = 250V I_C = 20A, R = 12.5Ω I_{B_1} = I_{B_2} = 4.0A t_p = 50μsec	0.05	0.07	0.05	0.07	0.05	0.07	μs
t_r		0.25	0.50	0.25	0.50	0.25	0.50	μs
t_s		2.00	2.50	2.00	2.50	2.00	2.50	μs
t_f		0.10	0.20	0.10	0.20	0.10	0.20	μs
t_s	**Inductive Load** V_{CLAMP} = 250V I_C = 20A, L = 100 μH I_{B_1} = I_{B_2} = 4.0A t_p = 50μsec	1.70	2.40	1.70	2.40	1.70	2.40	μs
t_{rv}		0.20	0.35	0.20	0.35	0.20	0.35	μs
t_{fi}		0.07	0.12	0.07	0.12	0.08	0.12	μs
t_c		0.30	0.50	0.30	0.50	0.30	0.50	μs
t_s 100° C		2.00	3.00	2.00	3.00	2.00	3.00	μs
t_{rv} 100° C		0.25	0.40	0.25	0.40	0.25	0.40	μs
t_{fi} 100° C		0.10	0.20	0.10	0.20	0.10	0.20	μs
t_c 100° C		0.40	0.70	0.40	0.70	0.40	0.70	μs

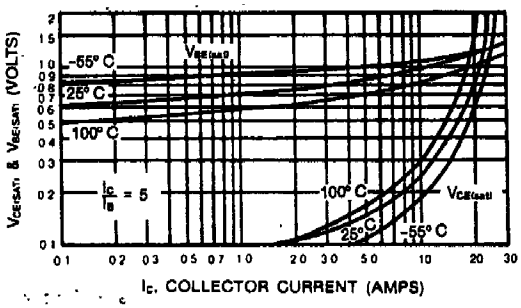
† Pulse Conditions: Width = 300μs; Duty Cycle ≤ 2% (measured using Kelvin connections).

Quality Semi-Conductors

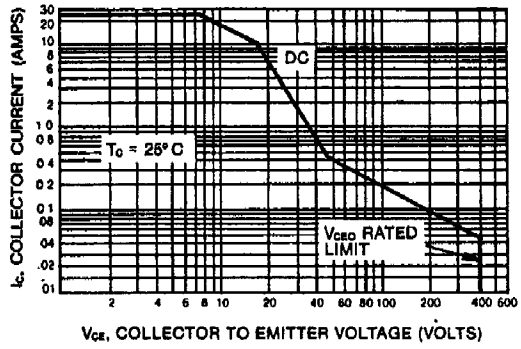
TYPICAL DC CURRENT GAIN



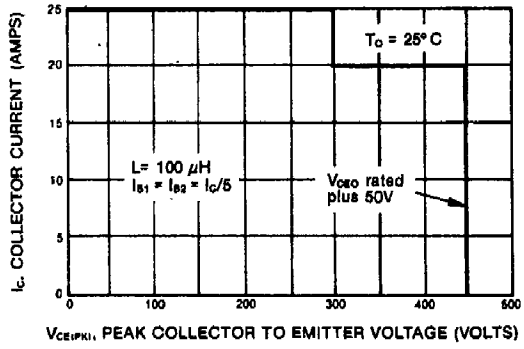
TYPICAL SATURATION VOLTAGE



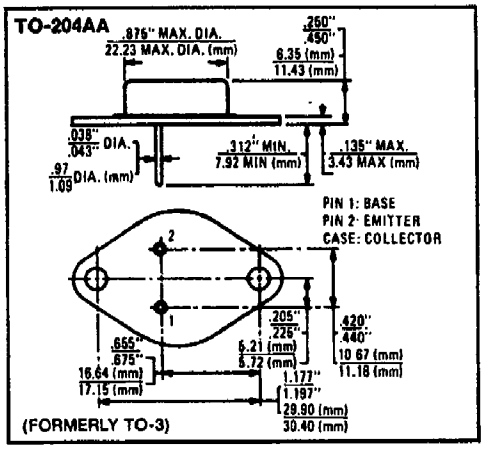
FORWARD BIASED SAFE OPERATING AREA

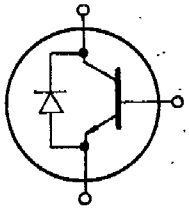


TURN-OFF SAFE OPERATING AREA



PACKAGE OUTLINE





Note:

The technology utilized to produce these devices results in an internal diode between the collector and emitter. In some cases this may eliminate the need for an external diode to clamp inductive loads. At 20 A, t_{rr} = 600 ns and V_F = 1.25V (typical).