

Specifications HGTG20N100D2

Electrical Specifications $T_C = +25^\circ\text{C}$, Unless Otherwise Specified

PARAMETERS	SYMBOL	TEST CONDITIONS	LIMITS			UNITS	
			MIN	TYP	MAX		
Collector-Emitter Breakdown Voltage	BV_{CES}	$I_C = 250\text{mA}$, $V_{GE} = 0\text{V}$	1000	-	-	V	
Collector-Emitter Leakage Voltage	I_{CES}	$V_{CE} = BV_{CES}$, $T_C = +25^\circ\text{C}$	-	-	250	μA	
		$V_{CE} = 0.8 BV_{CES}$, $T_C = +125^\circ\text{C}$	-	-	1.0	mA	
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = I_{C90}$, $V_{GE} = 15\text{V}$	$T_C = +25^\circ\text{C}$	-	3.1	3.8	V
			$T_C = +125^\circ\text{C}$	-	2.9	3.6	V
		$I_C = I_{C90}$, $V_{GE} = 10\text{V}$	$T_C = +25^\circ\text{C}$	-	3.3	4.1	V
			$T_C = +125^\circ\text{C}$	-	3.2	4.0	V
Gate-Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C = 500\mu\text{A}$, $V_{CE} = V_{GE}$	3.0	4.5	6.0	V	
Gate-Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 20\text{V}$	-	-	± 250	nA	
Gate-Emitter Plateau Voltage	V_{GEP}	$I_C = I_{C90}$, $V_{CE} = 0.5 BV_{CES}$	-	7.1	-	V	
On-State Gate Charge	$Q_{G(ON)}$	$I_C = I_{C90}$, $V_{CE} = 0.5 BV_{CES}$	$V_{GE} = 15\text{V}$	-	120	160	nC
			$V_{GE} = 20\text{V}$	-	163	212	nC
Current Turn-On Delay Time	$t_{D(ON)I}$	$L = 50\mu\text{H}$, $I_C = I_{C90}$, $R_G = 25\Omega$, $V_{GE} = 15\text{V}$, $T_J = +125^\circ\text{C}$, $V_{CE} = 0.8 BV_{CES}$	-	100	-	ns	
Current Rise Time	t_{RI}		-	150	-	ns	
Current Turn-Off Delay Time	$t_{D(OFF)I}$		-	500	650	ns	
Current Fall Time	t_{FI}		-	520	680	ns	
Turn-Off Energy (Note 1)	W_{OFF}		-	3.7	-	mJ	
Turn-Off Energy (Note 1)	W_{OFF}		-	3.7	-	mJ	
Thermal Resistance	$R_{\theta JC}$		-	0.7	0.83	$^\circ\text{C/W}$	

NOTE: 1. Turn-Off Energy Loss (W_{OFF}) is defined as the integral of the instantaneous power loss starting at the trailing edge of the input pulse and ending at the point where the collector current equals zero ($I_C = 0\text{A}$). The HGTG20N100D2 was tested per JEDEC standard No. 24-1 Method for Measurement of Power Device Turn-Off Switching Loss. This test method produces the true total Turn-Off Energy Loss.

Typical Performance Curves

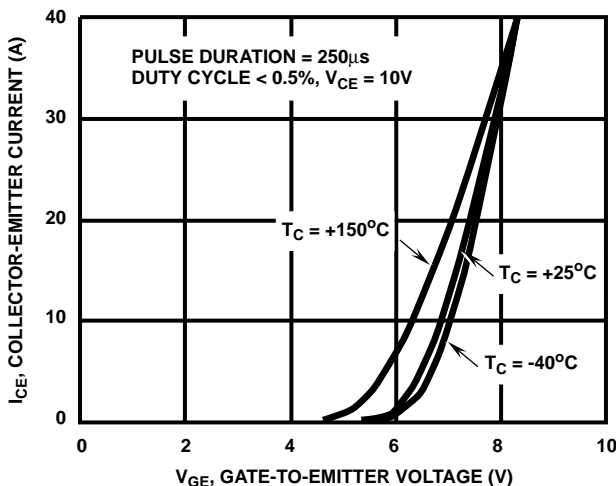


FIGURE 1. TRANSFER CHARACTERISTICS (TYPICAL)

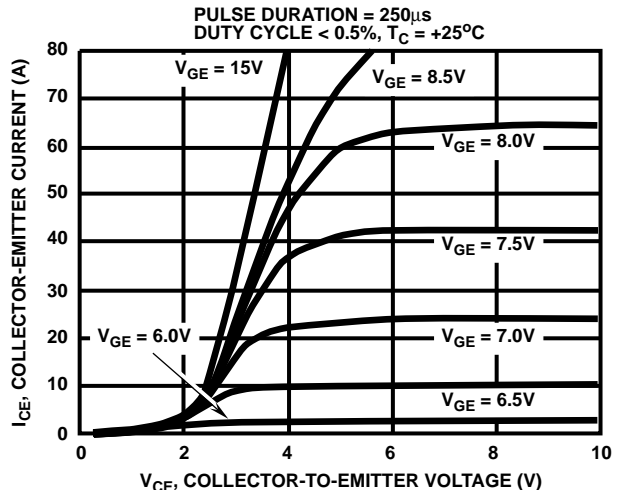


FIGURE 2. SATURATION CHARACTERISTICS (TYPICAL)

Typical Performance Curves (Continued)

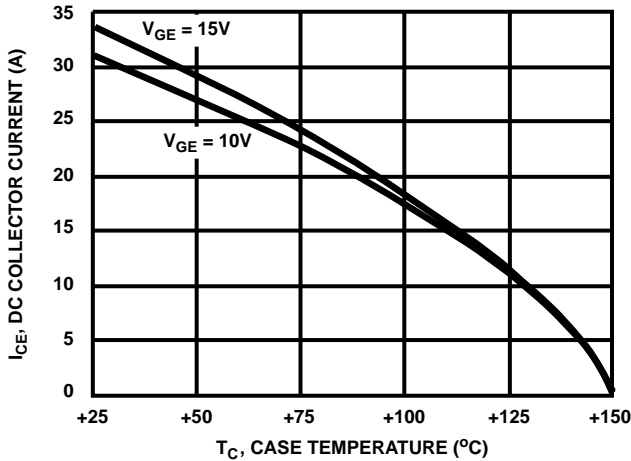


FIGURE 3. DC COLLECTOR CURRENT vs CASE TEMPERATURE

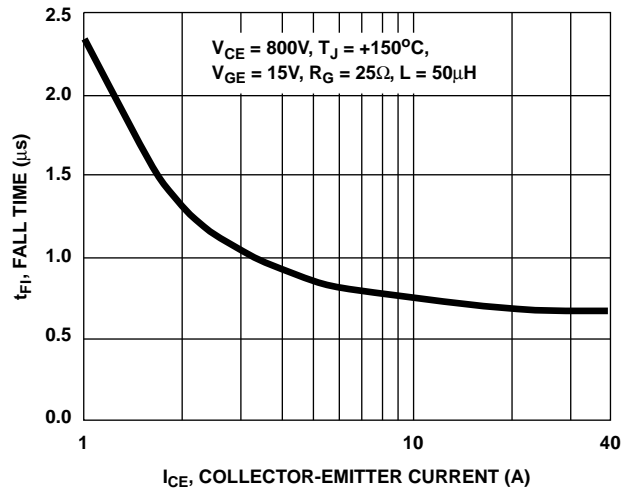


FIGURE 4. FALL TIME vs COLLECTOR-EMITTER CURRENT

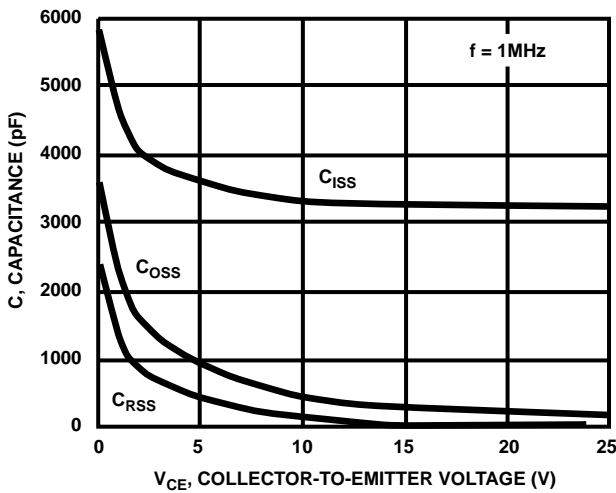


FIGURE 5. CAPACITANCE vs COLLECTOR-EMITTER VOLTAGE

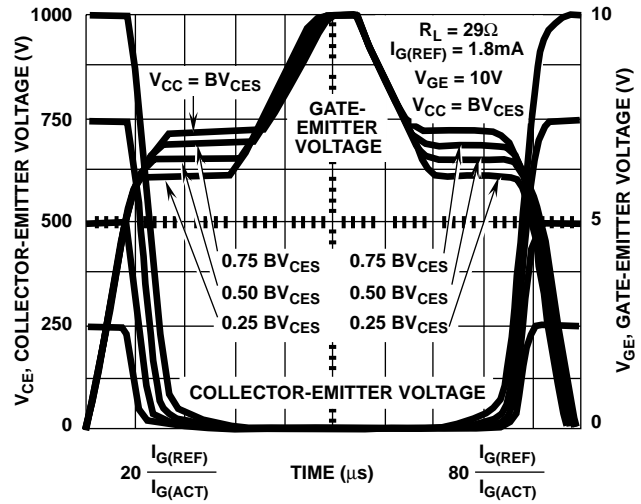


FIGURE 6. NORMALIZED SWITCHING WAVEFORMS AT CONSTANT GATE CURRENT (REFER TO APPLICATION NOTES AN7254 AND AN7260)

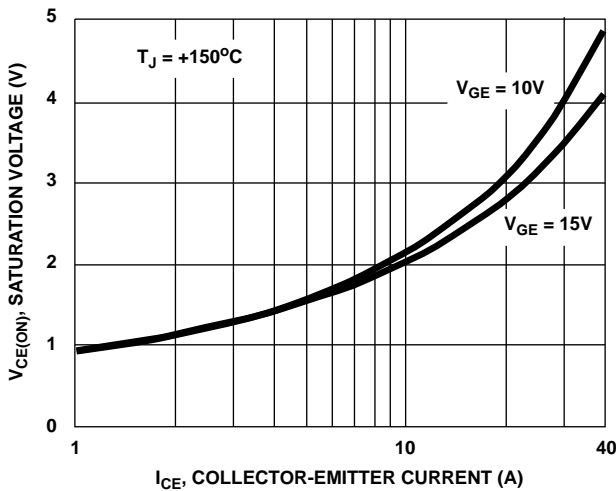


FIGURE 7. SATURATION VOLTAGE vs COLLECTOR-EMITTER CURRENT

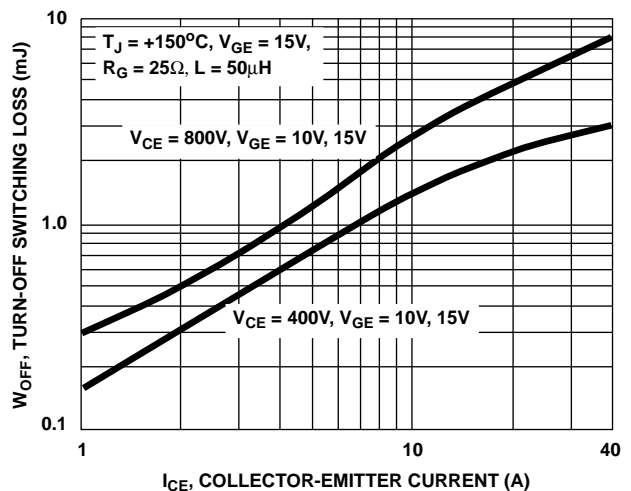


FIGURE 8. TURN-OFF SWITCHING LOSS vs COLLECTOR-EMITTER CURRENT

Typical Performance Curves (Continued)

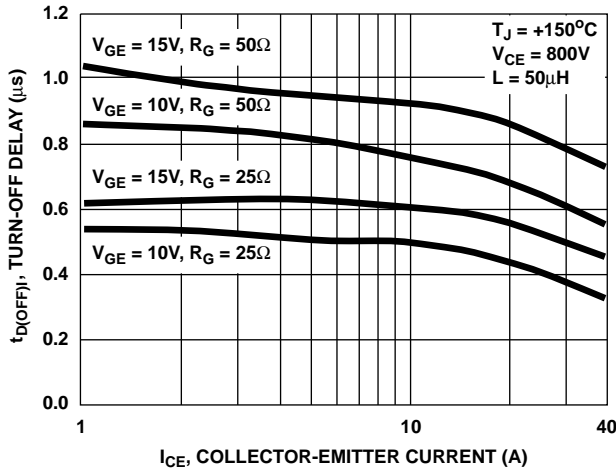


FIGURE 9. TURN-OFF DELAY vs COLLECTOR-EMITTER CURRENT

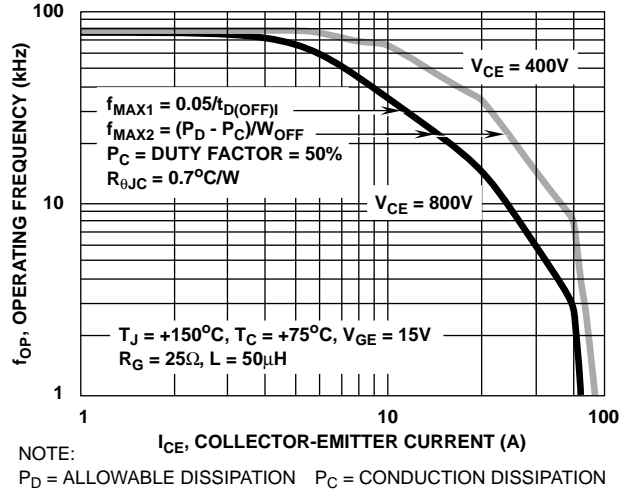


FIGURE 10. OPERATING FREQUENCY vs COLLECTOR-EMITTER CURRENT AND VOLTAGE

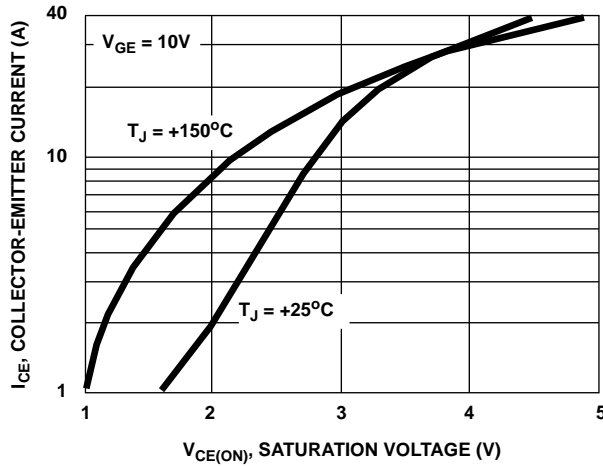


FIGURE 11. COLLECTOR-EMITTER SATURATION VOLTAGE

Test Circuit

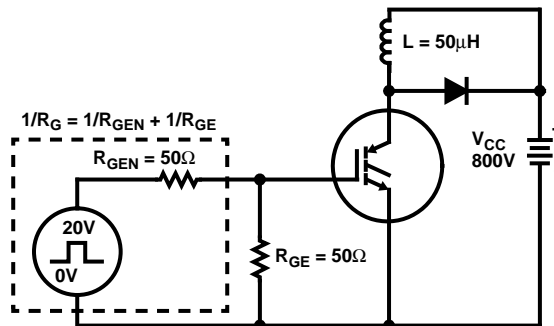


FIGURE 12. INDUCTIVE SWITCHING TEST CIRCUIT

Operating Frequency Information

Operating frequency information for a typical device (Figure 10) is presented as a guide for estimating device performance for a specific application. Other typical frequency vs collector current (I_{CE}) plots are possible using the information shown for a typical unit in Figures 7, 8 and 9. The operating frequency plot (Figure 10) of a typical device shows f_{MAX1} or f_{MAX2} whichever is smaller at each point. The information is based on measurements of a typical device and is bounded by the maximum rated junction temperature.

f_{MAX1} is defined by $f_{MAX1} = 0.05/t_{D(OFF)} \cdot t_{D(OFF)}$ deadtime (the denominator) has been arbitrarily held to 10% of the on-state time for a 50% duty factor. Other definitions are possible. $t_{D(OFF)}$ is defined as the time between the 90% point of the trailing edge of the input pulse and the point where the collector current falls to 90% of its maximum value. Device

turn-off delay can establish an additional frequency limiting condition for an application other than T_{JMAX} . $t_{D(OFF)}$ is important when controlling output ripple under a lightly loaded condition.

f_{MAX2} is defined by $f_{MAX2} = (P_D - P_C)/W_{OFF}$. The allowable dissipation (P_D) is defined by $P_D = (T_{JMAX} - T_C)/R_{\theta JC}$. The sum of device switching and conduction losses must not exceed P_D . A 50% duty factor was used (Figure 10) and the conduction losses (P_C) are approximated by $P_C = (V_{CE} \cdot I_{CE})/2$. W_{OFF} is defined as the integral of the instantaneous power loss starting at the trailing edge of the input pulse and ending at the point where the collector current equals zero ($I_{CE} = 0A$).

The switching power loss (Figure 10) is defined as $f_{MAX2} \cdot W_{OFF}$. Turn-on switching losses are not included because they can be greatly influenced by external circuit conditions and components.