

600V, SMPS Series N-Channel IGBT with Anti-Parallel Hyperfast Diode

The HGTG7N60A4D, HGTP7N60A4D and HGT1S7N60A4DS are MOS gated high voltage switching devices combining the best features of MOSFETs and bipolar transistors. These devices have the high input impedance of a MOSFET and the low on-state conduction loss of a bipolar transistor. The much lower on-state voltage drop varies only moderately between 25°C and 150°C. The IGBT used is the development type TA49331. The diode used in anti-parallel is the development type TA49370.

This IGBT is ideal for many high voltage switching applications operating at high frequencies where low conduction losses are essential. **This device has been optimized for high frequency switch mode power supplies.**

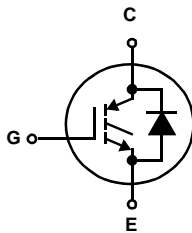
Formerly Developmental Type TA49333.

Ordering Information

PART NUMBER	PACKAGE	BRAND
HGTG7N60A4D	TO-247	7N60A4D
HGTP7N60A4D	TO-220AB	7N60A4D
HGT1S7N60A4DS	TO-263AB	7N60A4D

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-263AB variant in tape and reel, e.g., HGT1S7N60A4DS9A.

Symbol

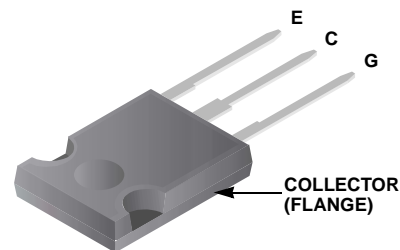


Features

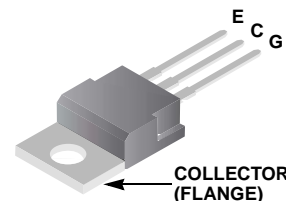
- >100kHz Operation At 390V, 7A
- 200kHz Operation At 390V, 5A
- 600V Switching SOA Capability
- Typical Fall Time. 75ns at $T_J = 125^\circ\text{C}$
- Low Conduction Loss
- Temperature Compensating SABER™ Model
www.fairchildsemi.com

Packaging

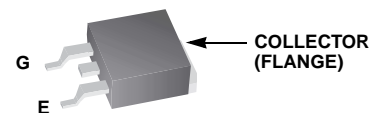
JEDEC STYLE TO-247



JEDEC TO-220AB



JEDEC TO-263AB



FAIRCHILD SEMICONDUCTOR IGBT PRODUCT IS COVERED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS

4,364,073	4,417,385	4,430,792	4,443,931	4,466,176	4,516,143	4,532,534	4,587,713
4,598,461	4,605,948	4,620,211	4,631,564	4,639,754	4,639,762	4,641,162	4,644,637
4,682,195	4,684,413	4,694,313	4,717,679	4,743,952	4,783,690	4,794,432	4,801,986
4,803,533	4,809,045	4,809,047	4,810,665	4,823,176	4,837,606	4,860,080	4,883,767
4,888,627	4,890,143	4,901,127	4,904,609	4,933,740	4,963,951	4,969,027	

HGTG7N60A4D, HGTP7N60A4D, HGT1S7N60A4DS

Absolute Maximum Ratings $T_C = 25^{\circ}\text{C}$, Unless Otherwise Specified

	ALL TYPES	UNITS
Collector to Emitter Voltage	BV_{CES} 600	V
Collector Current Continuous		
At $T_C = 25^{\circ}\text{C}$	I_{C25} 34	A
At $T_C = 110^{\circ}\text{C}$	I_{C110} 14	A
Collector Current Pulsed (Note 1)	I_{CM} 56	A
Gate to Emitter Voltage Continuous	V_{GES} ± 20	V
Gate to Emitter Voltage Pulsed	V_{GEM} ± 30	V
Switching Safe Operating Area at $T_J = 150^{\circ}\text{C}$, Figure 2	SSOA 35A at 600V	
Power Dissipation Total at $T_C = 25^{\circ}\text{C}$	P_D 125	W
Power Dissipation Derating $T_C > 25^{\circ}\text{C}$	1.0	W/ $^{\circ}\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG} -55 to 150	$^{\circ}\text{C}$
Maximum Lead Temperature for Soldering		
Leads at 0.063in (1.6mm) from Case for 10s.	T_L 300	$^{\circ}\text{C}$
Package Body for 10s, See Tech Brief 334	T_{PKG} 260	$^{\circ}\text{C}$

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. Pulse width limited by maximum junction temperature.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Collector to Emitter Breakdown Voltage	BV_{CES}	$I_C = 250\mu\text{A}$, $V_{GE} = 0\text{V}$	600	-	-	V
Collector to Emitter Leakage Current	I_{CES}	$V_{CE} = 600\text{V}$, $T_J = 25^{\circ}\text{C}$	-	-	250	μA
		$T_J = 125^{\circ}\text{C}$	-	-	2	mA
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 7\text{A}$, $V_{GE} = 15\text{V}$, $T_J = 25^{\circ}\text{C}$	-	1.9	2.7	V
		$T_J = 125^{\circ}\text{C}$	-	1.6	2.2	V
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C = 250\mu\text{A}$, $V_{CE} = 600\text{V}$	4.5	5.9	7	V
Gate to Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 20\text{V}$	-	-	± 250	nA
Switching SOA	SSOA	$T_J = 150^{\circ}\text{C}$, $R_G = 25\Omega$, $V_{GE} = 15\text{V}$, $L = 100\mu\text{H}$, $V_{CE} = 600\text{V}$	35	-	-	A
Gate to Emitter Plateau Voltage	V_{GEP}	$I_C = 7\text{A}$, $V_{CE} = 300\text{V}$	-	9	-	V
On-State Gate Charge	$Q_{g(ON)}$	$I_C = 7\text{A}$, $V_{CE} = 300\text{V}$, $V_{GE} = 15\text{V}$	-	37	45	nC
		$V_{GE} = 20\text{V}$	-	48	60	nC
Current Turn-On Delay Time	$t_{d(ON)I}$	IGBT and Diode at $T_J = 25^{\circ}\text{C}$, $I_{CE} = 7\text{A}$, $V_{CE} = 390\text{V}$, $V_{GE} = 15\text{V}$, $R_G = 25\Omega$, $L = 1\text{mH}$, Test Circuit (Figure 24)	-	11	-	ns
Current Rise Time	t_{rI}		-	11	-	ns
Current Turn-Off Delay Time	$t_{d(OFF)I}$		-	100	-	ns
Current Fall Time	t_{fI}		-	45	-	ns
Turn-On Energy	E_{ON1}		-	55	-	μJ
Turn-On Energy	E_{ON2}		-	120	150	μJ
Turn-Off Energy (Note 2)	E_{OFF}		-	60	75	μJ
Current Turn-On Delay Time	$t_{d(ON)I}$	IGBT and Diode at $T_J = 125^{\circ}\text{C}$, $I_{CE} = 7\text{A}$, $V_{CE} = 390\text{V}$, $V_{GE} = 15\text{V}$, $R_G = 25\Omega$, $L = 1\text{mH}$, Test Circuit (Figure 24)	-	10	-	ns
Current Rise Time	t_{rI}		-	7	-	ns
Current Turn-Off Delay Time	$t_{d(OFF)I}$		-	130	150	ns
Current Fall Time	t_{fI}		-	75	85	ns
Turn-On Energy (Note 2)	E_{ON1}		-	50	-	μJ
Turn-On Energy (Note 2)	E_{ON2}		-	200	215	μJ
Turn-Off Energy (Note 3)	E_{OFF}		-	125	170	μJ