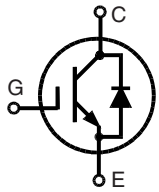
IGBT
with optional Diode

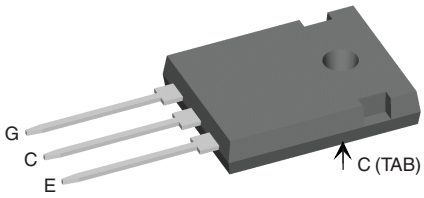
V_{CES} = 600 V
I_{C25} = 60 A
$V_{CE(sat)\ typ}$ = 2.1 V

High Speed,
Low Saturation Voltage

Replacements:
IXXH30N60B3D1 / IXYP30N65B3D1
IXXH30N65B4D1 / IXXH30N65B4D1



TO-247 AD



Gate, **E**mitter, **C**ollector, TAB = **C**ollector

Symbol	Conditions		Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C		600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 20 kΩ		600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C		60	A
I_{C90}	T_C = 90°C		35	A
I_{CM}	T_C = 90°C, t_p =1 ms		70	A
RBSOA	V_{GE} = ±15 V, T_J = 125°C, R_G = 10 Ω Clamped inductive load, L = 30 µH		I_{CM} = 110 V_{CEK} < V_{CES}	A
t_{SC} (SCSOA)	V_{GE} = ±15 V, V_{CE} = 600 V, T_J = 125°C R_G = 10 Ω, non repetitive		10	µs
P_C	T_C = 25°C	IGBT Diode	250 80	W W
T_J			-55 ... +150	°C
T_{stg}			-40 ... +150	°C
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s			300	°C
M_d	Mounting torque	TO-220 TO-247	0.4 - 0.6 0.8 - 1.2	Nm Nm
Weight			6	g

Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{(BR)CES}$	V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 0.7 mA, V_{CE} = V_{GE}		3		5	V
I_{CES}	V_{CE} = V_{CES}	T_J = 25°C T_J = 125°C		 1	0.1	mA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = 35 A, V_{GE} = 15 V			2.2	2.7	V

Features

- NPT IGBT technology
- low switching losses
- low tail current
- no latch up
- short circuit capability
- positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- optional ultra fast diode
- International standard package

Advantages

- Space savings
- High power density

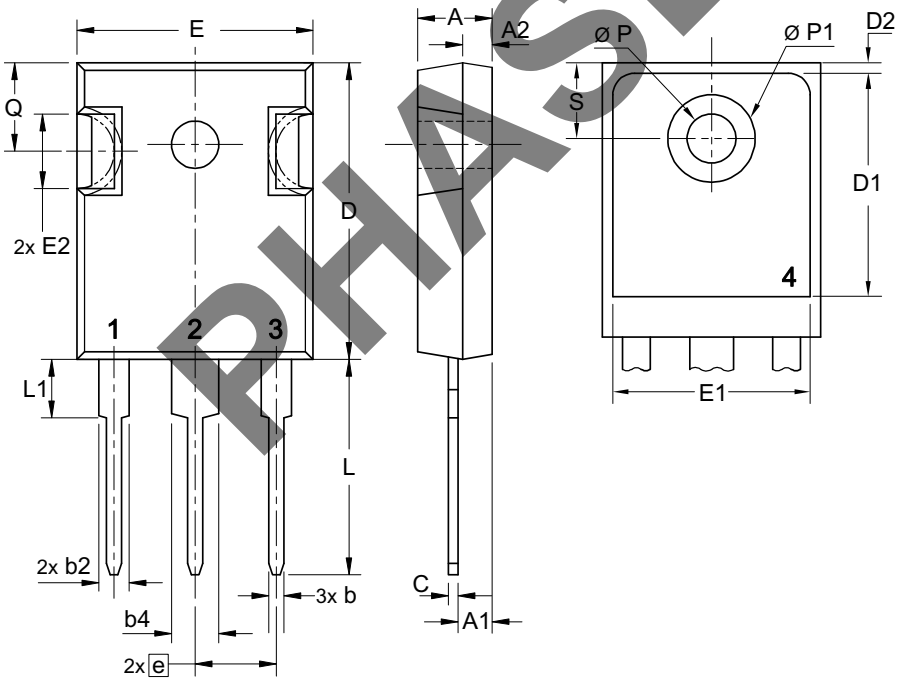
Typical Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninteruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1600		pF
C_{oes}			150		pF
C_{res}			90		pF
Q_g	I_C = 35 A, V_{GE} = 15 V, V_{CE} = 480 V		120		nC
$t_{d(on)}$	Inductive load, T_J = 125°C		30		ns
t_r	I_C = 35 A, V_{GE} = ±15 V,		45		ns
$t_{d(off)}$	V_{CE} = 300 V, R_G = 10 Ω		320		ns
t_f			70		ns
E_{on}			1.6		mJ
E_{off}			0.8		mJ
R_{thJC}				0.5	K/W
R_{thCH}	TO 247 Package with heatsink compound		0.25		K/W
R_{thCH}	TO 220 Package with heatsink compound		0.5		K/W

Reverse Diode (FRED) [D1 version only]

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 35 A, V_{GE} = 0 V		2.1	2.4	V
	I_F = 35 A, V_{GE} = 0 V, T_J = 125°C		1.6		V
I_F	T_C = 25°C			45	A
	T_C = 90°C			25	A
I_{RM}	I_F = 15 A, $-di_F/dt$ = 400 A/µs, V_R = 300 V		13		A
t_{rr}	V_{GE} = 0 V, T_J = 125°C		90		ns
t_{rr}	I_F = 1 A, $-di_F/dt$ = 100 A/µs, V_R = 30 V, V_{GE} = 0 V		40		ns
R_{thJC}				1.6	K/W



TO-247 AD Outline

Sym.	Inches min.	Inches max.	Millimeter min.	Millimeter max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242 BSC		6.14 BSC	
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39

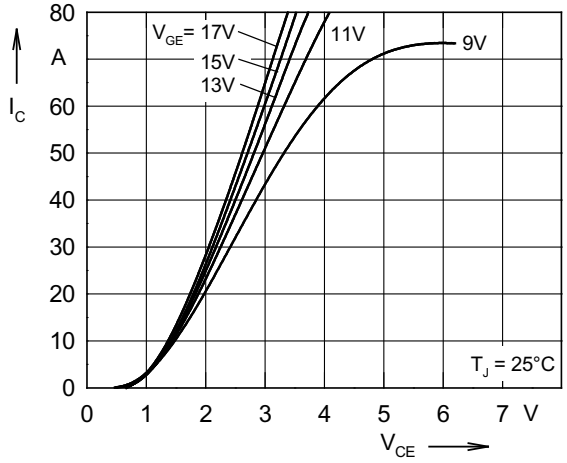


Fig. 1 Typ. output characteristics

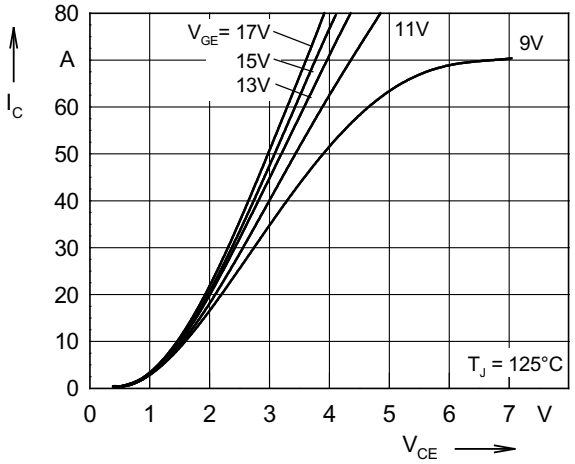


Fig. 2 Typ. output characteristics

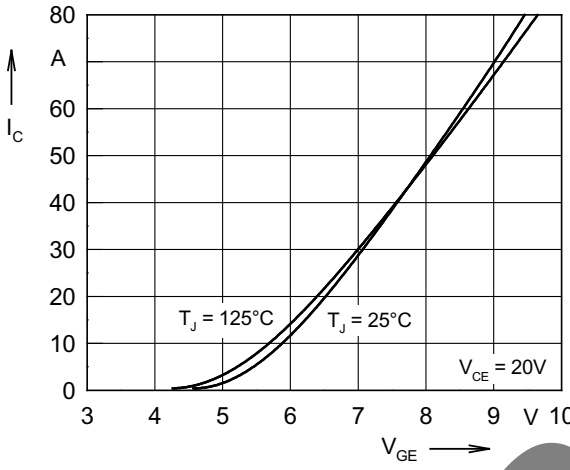


Fig. 3 Typ. transfer characteristics

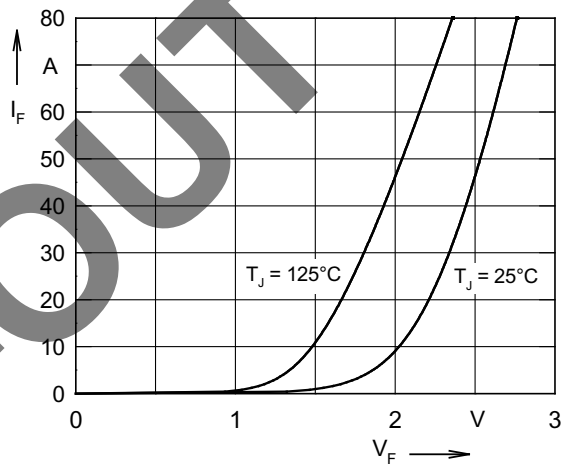


Fig. 4 Typ. forward characteristics of free wheeling diode

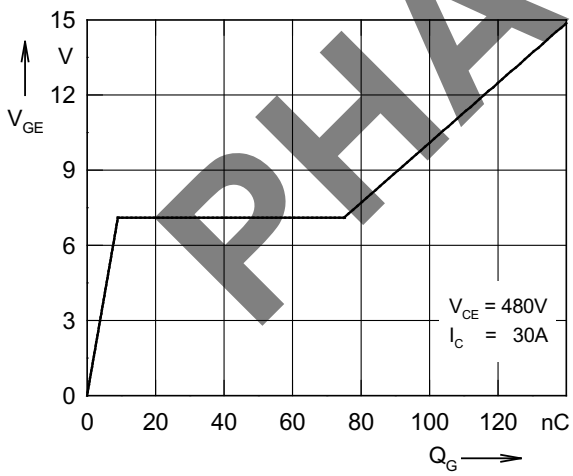


Fig. 5 Typ. turn on gate charge

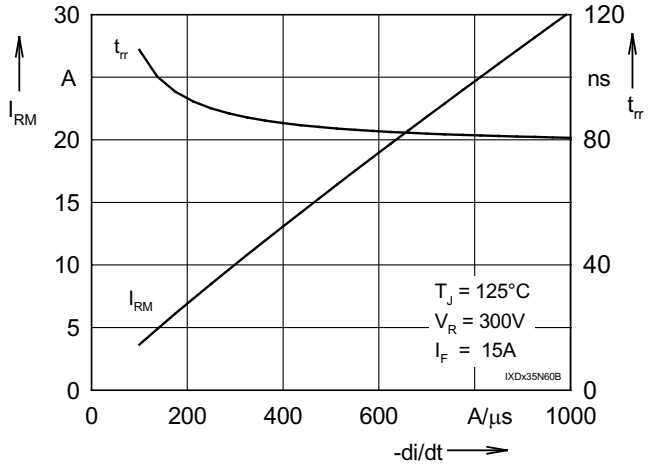


Fig. 6 Typ. turn off characteristics of free wheeling diode

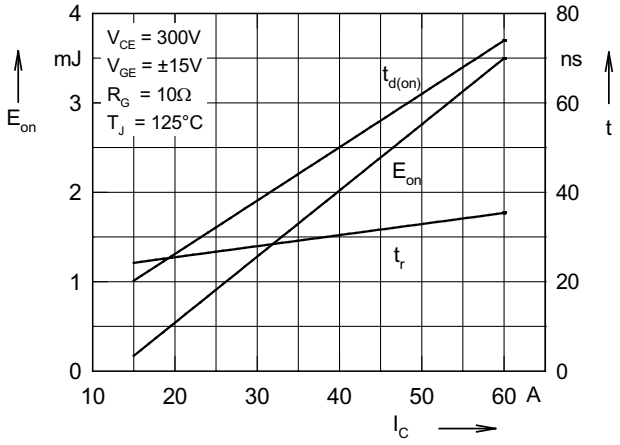


Fig. 7 Typ. turn on energy and switching times versus collector current

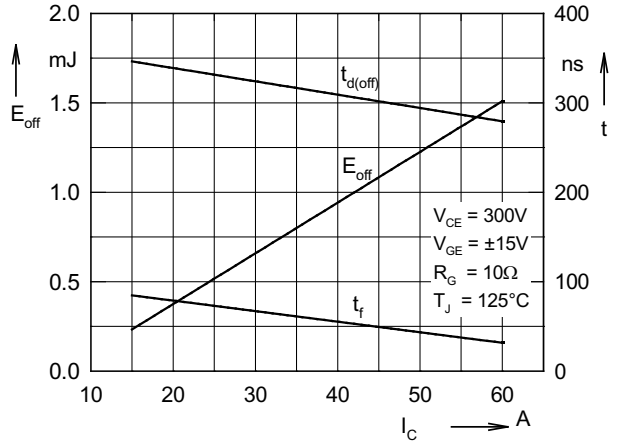


Fig. 8 Typ. turn off energy and switching times versus collector current

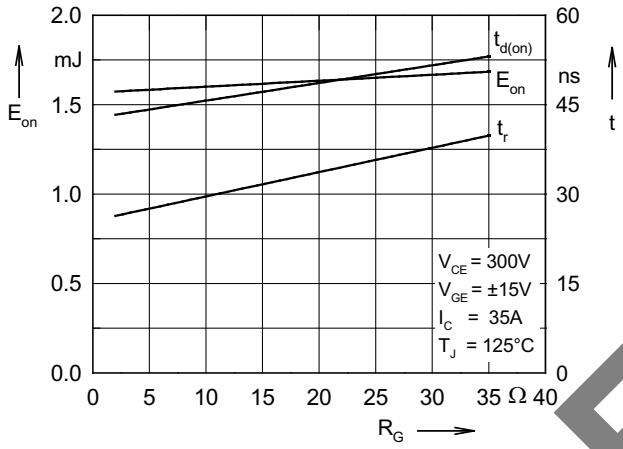


Fig. 9 Typ. turn on energy and switching times versus gate resistor

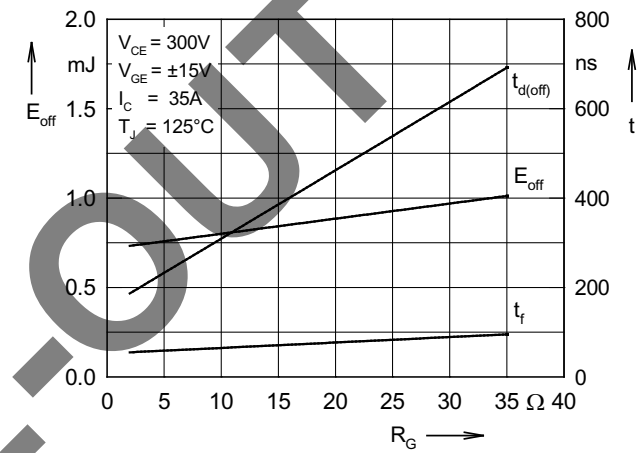


Fig.10 Typ. turn off energy and switching times versus gate resistor

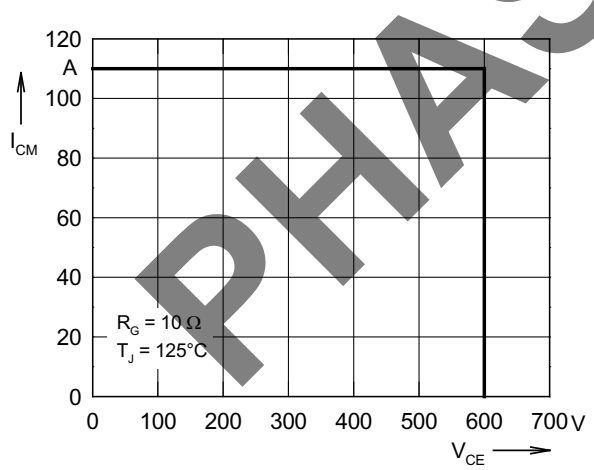


Fig. 11 Reverse biased safe operating area RBSOA

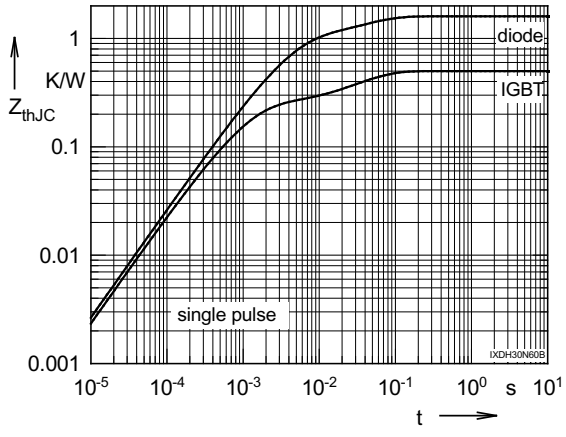


Fig. 12 Typ. transient thermal impedance