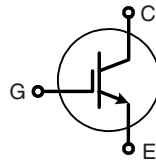


NPT³ IGBT

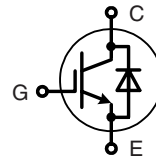
$$I_{C25} = 60 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

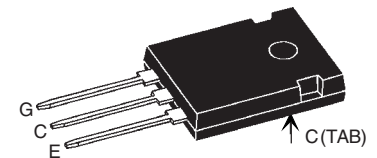
$$V_{CE(sat) \text{ typ.}} = 2.4 \text{ V}$$



IXEH 40N120



IXEH 40N120D1

TO-247 AD

IGBT

Symbol	Conditions	Maximum Ratings	
V_{CES}	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	1200	V
V_{GES}		± 20	V
I_{C25}	$T_C = 25^{\circ}\text{C}$	60	A
I_{C90}	$T_C = 90^{\circ}\text{C}$	40	A
I_{CM} V_{CEK}	$V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$ RBSOA, Clamped inductive load; $L = 100 \mu\text{H}$	50	A
		V_{CES}	
t_{SC} (SCSOA)	$V_{CE} = 900\text{V}; V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	300	W

Features

- NPT³ IGBT
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance in resonant circuits
- optional HiPerFRED™ diode
 - fast reverse recovery
 - low operating forward voltage
 - low leakage current
- TO-247 package
 - industry standard outline
 - epoxy meets UL 94V-0

Applications

- AC drives
- DC drives and choppers
- Uninterruptible power supplies (UPS)
- switched-mode and resonant-mode power supplies
- inductive heating, cookers

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 40 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	2.4	3.0	V
		2.8		V
$V_{GE(th)}$	$I_C = 1 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5 V
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.4		0.4 mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			200 nA
$t_{d(on)}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 40 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega$	85		ns
t_r		50		ns
$t_{d(off)}$		440		ns
t_f		50		ns
E_{on}		6.1		mJ
E_{off}		3.0		mJ
C_{ies}	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$	2		nF
Q_{Gon}	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 35 \text{ A}$	150		nC
R_{thJC}				0.42 KW

Diode [D1 version only]

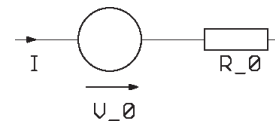
Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	60	A
I_{F90}	$T_C = 90^\circ\text{C}$	35	A

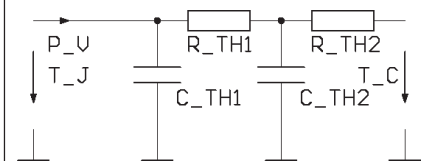
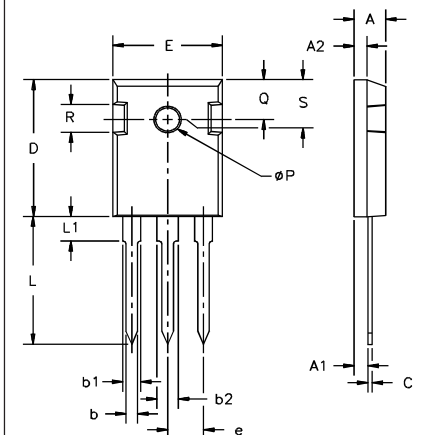
Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 40\text{ A}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.6	3.0	V
I_{RM}	$I_F = 30\text{ A}; di_F/dt = -500\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V}$	51		A
t_{rr}		180		ns
$E_{rec(off)}$		1.8		mJ
R_{thJC}			1.0	K/W

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-55...+150	$^\circ\text{C}$
T_{stg}		-55...+150	$^\circ\text{C}$
M_d	mounting torque	0.8...1.2	Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
R_{thCH}	with heatsink compound	0.25		K/W
Weight		6		g

Equivalent Circuits for Simulation
Conduction

 IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 0.95\text{ V}; R_0 = 45\text{ m}\Omega$

 Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.26\text{ V}; R_0 = 15\text{ m}\Omega$
Thermal Response

IGBT
 $C_{th1} = 0.007\text{ J/K}; R_{th1} = 0.215\text{ K/W}$
 $C_{th2} = 0.187\text{ J/K}; R_{th2} = 0.205\text{ K/W}$
Diode
 $C_{th1} = 0.006\text{ J/K}; R_{th1} = 0.649\text{ K/W}$
 $C_{th2} = 0.113\text{ J/K}; R_{th2} = 0.351\text{ K/W}$
TO-247 AD Outline


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A ₁	2.2	2.54	.087	.102
A ₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b ₁	1.65	2.13	.065	.084
b ₂	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

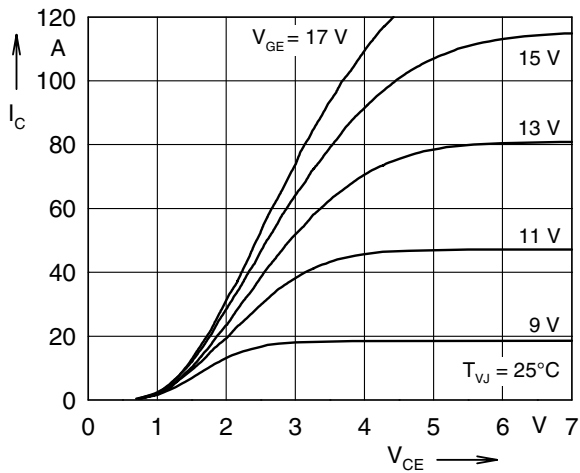


Fig. 1 Typ. output characteristics

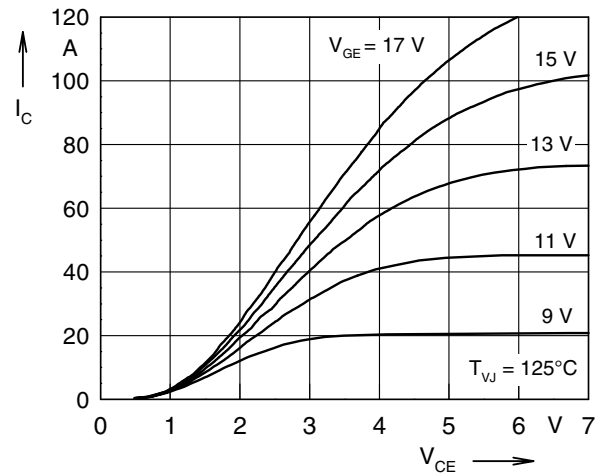


Fig. 2 Typ. output characteristics

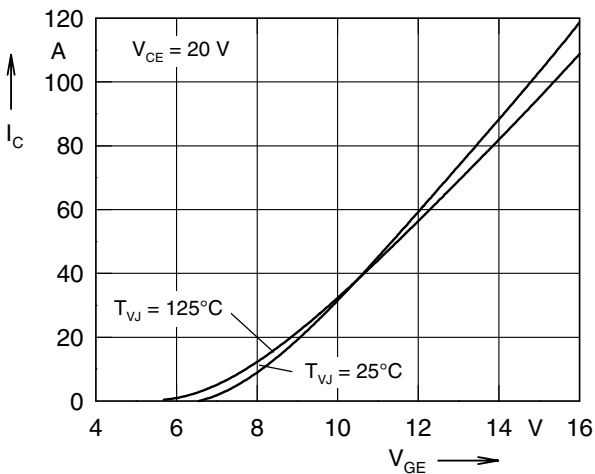


Fig. 3 Typ. transfer characteristics

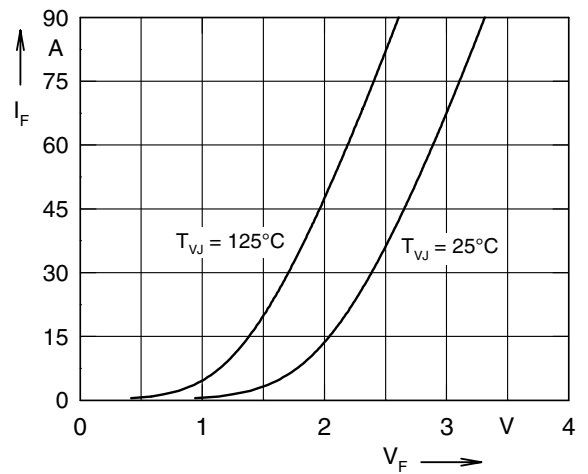


Fig. 4 Typ. forward characteristics of free wheeling diode

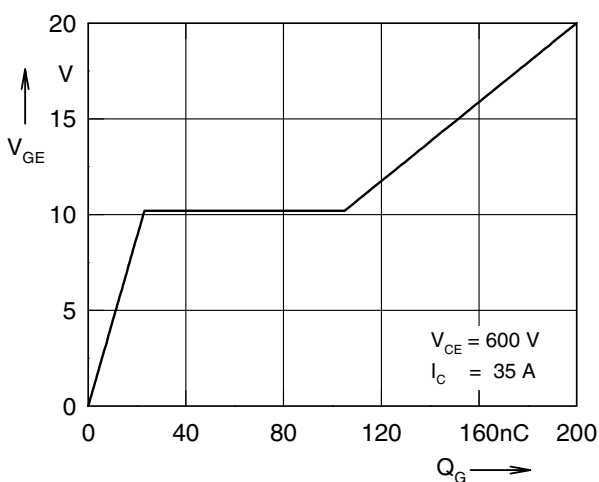


Fig. 5 Typ. turn on gate charge

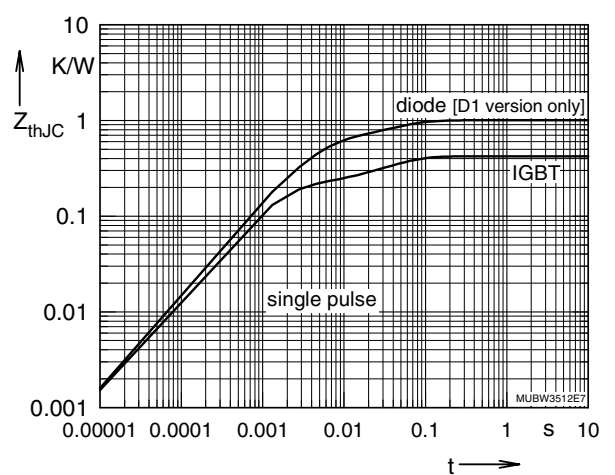


Fig. 6 Typ. transient thermal impedance

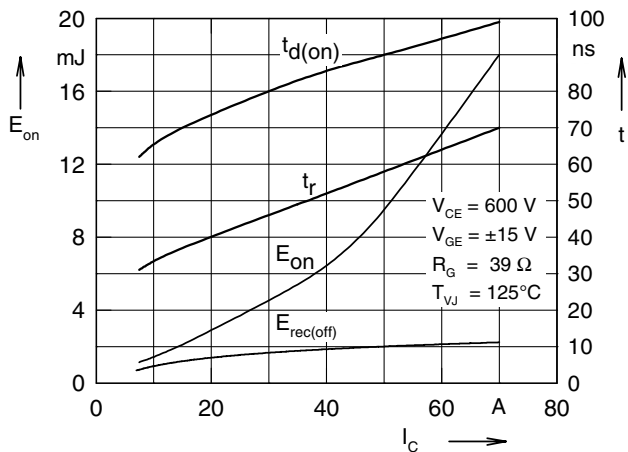


Fig. 7 Typ. turn on energy and switching times versus collector current

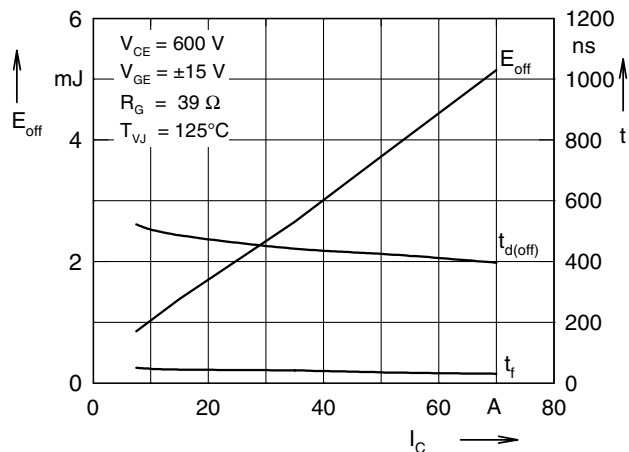


Fig. 8 Typ. turn off energy and switching times versus collector current

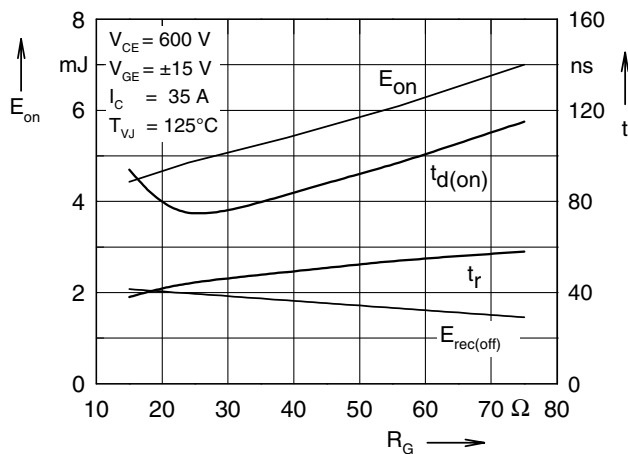


Fig. 9 Typ. turn on energy and switching times versus gate resistor

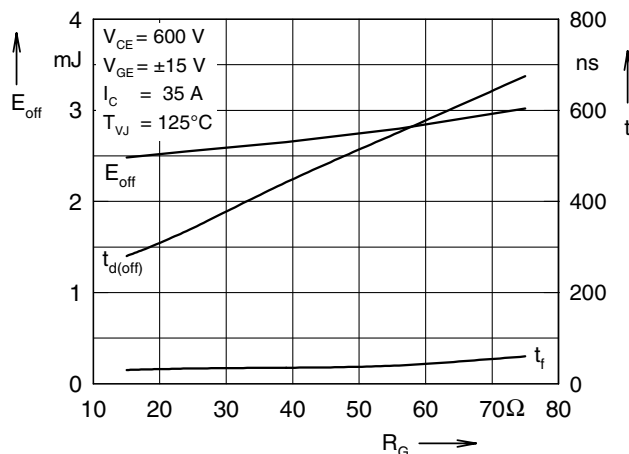


Fig. 10 Typ. turn off energy and switching times versus gate resistor

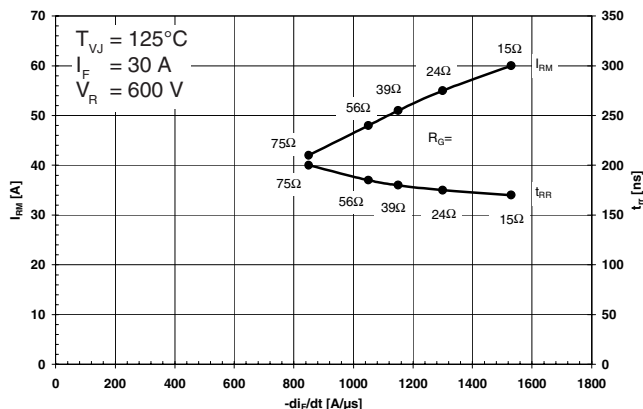


Fig. 11 Typ. turn off characteristics of free wheeling diode

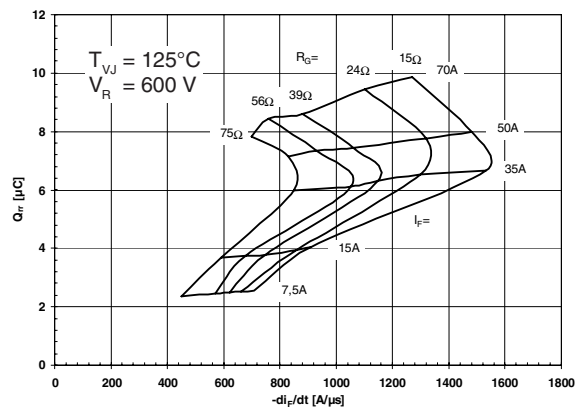


Fig. 12 Typ. turn off characteristics of free wheeling diode