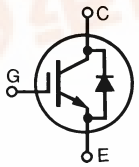
IXYS

High Voltage IGBT with Diode

IXSK 35N120BD1
IXSX 35N120BD1

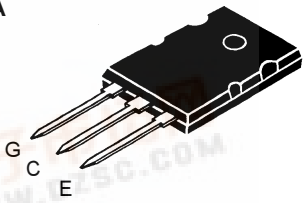
V_{CES} = 1200 V
I_{C25} = 70 A
$V_{CE(SAT)}$ = 3.6 V

Short Circuit SOA Capability

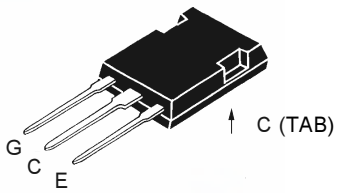


Preliminary data sheet

TO-264 AA (IXSK)



PLUS TO-247™ (IXSX)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	70	A
I_{C90}	T_C = 90°C	35	A
I_{CM}	T_C = 25°C, 1 ms	140	A
SSOA (RBSOA)	V_{GE} = 15 V, T_J = 125°C, R_G = 5 Ω Clamped inductive load	I_{CM} = 90 @ 0.8 V_{CES}	A
t_{SC} (SCSOA)	V_{GE} = 15 V, V_{CE} = 720 V, T_J = 125°C R_G = 5 Ω, non repetitive	10	µs
P_C	T_C = 25°C IGBT Diode	300 190	W W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s	300	°C
Weight	TO-264 PLUS247	10 6	g g

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 3 mA, V_{GE} = 0 V	1200			V
$V_{GE(th)}$	I_C = 250 µA, V_{CE} = V_{GE}	3		6	V
I_{CES} ①	V_{CE} = 0.8 • V_{CES} V_{GE} = 0 V T_J = 125°C			1 3	mA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V			±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			3.6	V

Features

- Hole-less TO-247 package for clip mounting
- High frequency IGBT and anti-parallel FRED in one package
- Low $V_{CE(sat)}$
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Epitaxial Diode (FRED)
  - soft recovery with low I_{RM}

Applications

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

Advantages

- Space savings (two devices in one package)
- Reduces assembly time and cost
- High power density

① Device must be heatsunk for high temperature measurements to avoid thermal runaway.

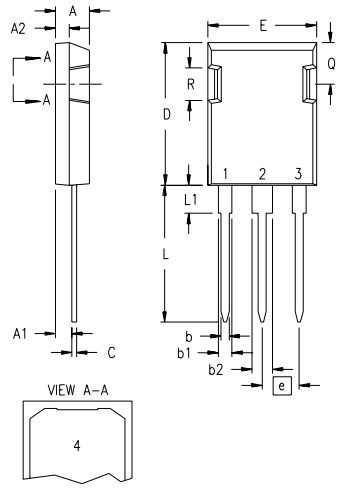
IXSX 35N120BD1

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %	16	23		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		3600		pF
C_{oes}			315		pF
C_{res}			75		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		120		nC
Q_{ge}			33		nC
Q_{gc}			49		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		36		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V,		27		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, R_G = 5.0 Ω		160	300	ns
t_{fi}	Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		180	300	ns
E_{off}			5	9	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		38		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V,		29		ns
E_{on}	V_{CE} = 0.8 V_{CES}, R_G = 5.0 Ω		6		mJ
$t_{d(off)}$	Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		240		ns
t_{fi}			340		ns
E_{off}			9		mJ
R_{thJC}				0.42	K/W
R_{thCK}			0.15		K/W

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 130A, V_{GE} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %, T_J = 125°C			2.75	V
				1.85	V
I_{RM}	I_F = 130A, V_{GE} = 0 V, -di_F/dt = 100 A/μs T_J = 100°C		7	14.3	A
t_{rr}	V_R = 100 V				
	I_F = 1 A; -di/dt = 200 A/μs; V_R = 30 V		40		ns
R_{thJC}				0.65	K/W

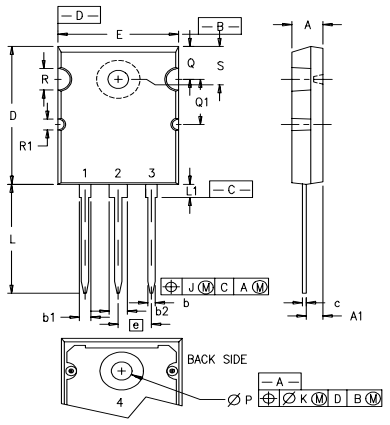
TO-247 HOLE-LESS Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – DRAIN (COLLECTOR)

TO-264 AA Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215 BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

1 – GATE
2, 4 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)