IXYS

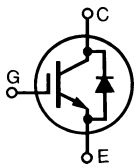
Advanced Technical Information

IGBT with Diode
ISOPLUS 247™
(Electrically Isolated Backside)

IXSR 35N120BD1

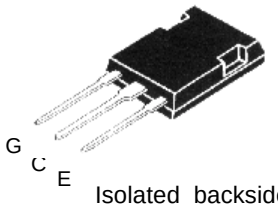
V_{CES} = 1200 V
I_{C25} = 70 A
$V_{CE(sat)}$ = 3.6 V
$t_{fi(typ)}$ = 160 ns

Short Circuit SOA Capability



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		30	A
I_{CM}	T_C = 25°C, 1 ms		140	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 22 Ω Clamped inductive load, L = 30 μH		I_{CM} = 90 @ 0.8 V_{CES}	A
t_{SC} **(SCSOA)**	V_{GE} = 15 V, V_{CE} = 360 V, T_J = 125°C R_G = 22 Ω, non repetitive		10	μs
P_C	T_C = 25°C	IGBT	250	W
		Diode	150	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min leads-to housing	2500	V~
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s			300	°C
Weight			5	g

ISOPLUS 247™
E 153432



Isolated backside*

G = Gate, C = Collector,
E = Emitter

* Patent pending

Features

- DCB Isolated mounting tab
- Meets TO-247AD package outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on
  - drive simplicity

Applications

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

Advantages

- Easy assembly
- High power density

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}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			1	mA
	V_{GE} = 0 V	T_J = 150°C			3	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_T, V_{GE} = 15 V				3.6	V

① Device must be heatsunk for high temperature measurements to avoid thermal runaway.
IXYS reserves the right to change limits, test conditions and dimensions

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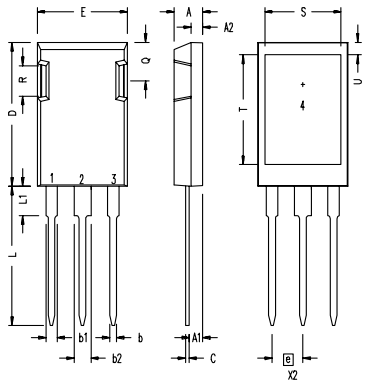
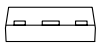
Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	min.	typ.	max.	
g_{fs}	$I_C = I_T$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	16	23		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		3600		pF
C_{oss}			315		pF
C_{rss}			75		pF
Q_g	$I_C = I_T$, V_{GE} = 15 V, V_{CE} = 0.5 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}	$I_C = I_T$, V_{GE} = 15 V, L = 100 µH,		27		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω		160	300	ns
t_{fi}	Remarks: 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}	$I_C = I_T$, V_{GE} = 15 V, L = 100 µH		29		ns
E_{on}	V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω		6		mJ
$t_{d(off)}$	Remarks: 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}				0.5	K/W
R_{thCK}			0.15		K/W

ISOPLUS 247 OUTLINE





1 Gate, 2 Drain (Collector)
3 Source (Emitter)
4 no connection

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	min.	typ.	max.	
V_F	$I_F = I_T$, V_{GE} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %			2.75 1.85	V
I_{RM}	$I_F = I_T$, V_{GE} = 0 V, $-di_F/dt$ = 100 A/µs		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}				0.83	K/W

Note: 1. I_T = 35A

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IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025