IXYS

TrenchMV™ Power MOSFETs

NEXT GENERATION POWER MOSFETs FROM 55V TO 100V

FEBRUARY 2007

IXYS has developed a new platform of Power MOSFETs called TrenchMV™. TrenchMV covers the 55V to 100V range with currents ranging from 44A to 280A. These new devices utilize IXYS unique Trench MOSFET technology to provide extremely low power dissipation with ultra-low Rds(on) and an optimized intrinsic reverse diode. This new platform of Power MOSFETs is a part of IXYS growing product line aimed at low voltage power conversion applications.

TrenchMV Power MOSFETS find use in many applications. These devices are designed to withstand even the most robust operating conditions required by the automotive market, as well as the industrial sector. Other applications include DC/DC converters, battery chargers, motor drives and others. Additional Trench products and package options are in process, including options for lower and higher voltages.

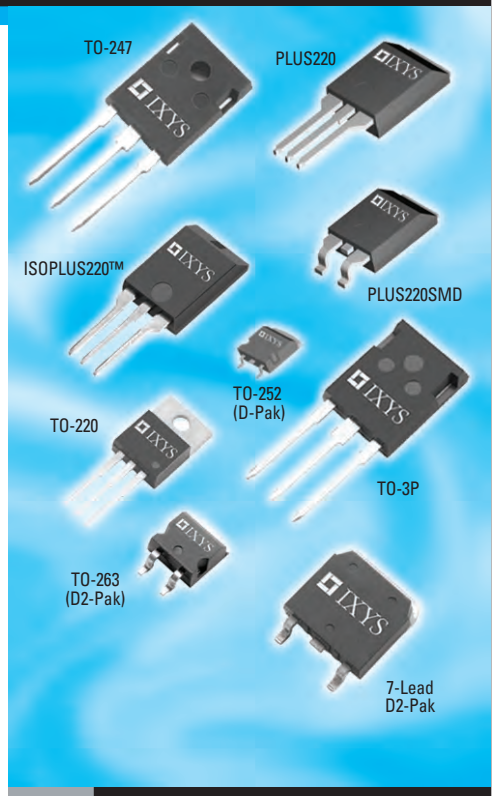
IXYS offers a full range of standard packages and a full range of surface mount and discrete packages… TO-220, TO-252, SOT-227B, etc. In addition, versions are offered in IXYS proprietary ISOPLUS™ packages, providing UL recognized 2500V isolation with superior thermal performance. Electrically isolated tabbed packages include the ISOPLUS220™, ISOPLUS i4-Pak™ and ISOPLUS i5-Pak™.

FEATURES:

- Very low $R_{DS(on)}$
- High power density
- Low package inductance
- Unclamped Inductive Switching (UIS) rated
- UL recognized isolated ISOPLUS™ packages

BENEFITS:

- Rugged operation
- Easy to drive and protect
- Cost-effective
- Space saving
- Easy to mount



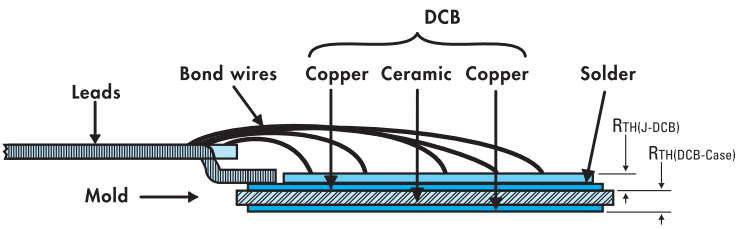
POWER DEVICES
>>> Power MOSFET Discretes
RF Power MOSFETs
IGBT Discretes
IGBT Modules
Ultra Fast Rectifiers
Silicon Schottky Rectifiers
GaAs Schottky Rectifiers
SCRs and Thyristors
Rectifiers Bridges

ICS AND GATE DRIVERS
MOSFET and IGBT Gate Drivers
Half Bridge Gate Drivers
PWM Controllers

FUNCTIONAL SOLUTIONS
PFC Modules
Converter/Brake/Inverter Modules
Boost & Buck Power Modules

The ISOPLUS™ Advantage

All IXYS ISOPLUS packages are manufactured with an internal direct-copper-bonded (DCB) isolated substrate, are UL certified and provide integral backside case isolation. These packages provide high isolation capability (up to 2500V), improve creepage distance and dramatically reduce total thermal resistance. Additionally, the ceramic alumina substrates used also dramatically enhance device reliability by greatly improving thermal and power cycling. The DCB can be patterned like a printed circuit board, which enables the unique integration capabilities of IXYS ISOPLUS packages. Kunze high performance phase change materials can be used to further enhance ISOPLUS package thermal performance.



- Provides 2500V, UL recognized isolation with superior thermal performance (E153432).
- Improves temperature and power cycling capability.
- Cost effective clip mounting.

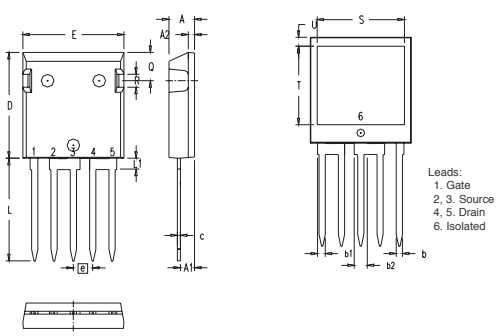
* IXYS Patented Packages, Patent No. 6,404,065

Example Part + Isolation Medium	$R_{TH(J-C)}$		$R_{TH(C-S)}$	$R_{TH(J-S)}$
IXTH220N055T with SIL-PAD 2000™	0.42 C/W		2.37 C/W	2.79 C/W
IXTC220N055T (ISOPLUS220™ with Internal DCB Isolation)	$R_{TH(J-DCB)}$ 0.6 C/W	$R_{TH(DCB-Case)}$ 0.4 C/W	0.25 C/W	1.25 C/W

– Denotes Inclusion of Isolation Boundary.

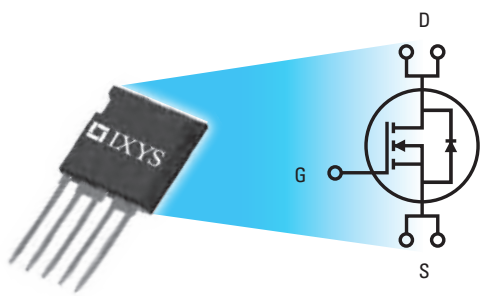
TrenchMV™ Power MOSFETs in 5-lead ISOPLUS i4-Paks™

The principal feature of this subset of TrenchMV Power MOSFETs arises from the high power handling capability and special lead configuration found in the IXYS discrete ISOPLUS i4-Pak. Silicon current handling has outpaced the ability of most traditional discrete packaging, which typically limits steady state current to 75A. The powerful ISOPLUS i4-Pak is used to full effect in this instance by combining its superior isolation, thermal and power cycling capabilities and flexible configuration. In this case, the ISOPLUS i4-Pak is configured with 5 heavy-gage leads to provide a high current drain and source paired lead set with joined copper webs and backside heat sinking, all of which conservatively improve the lead current rating to 150A.



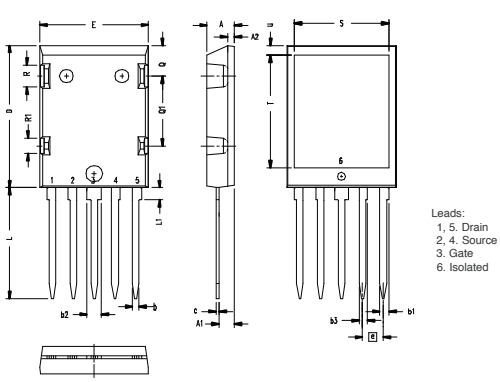
SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.085	1.17	2.16
b	.045	.055	1.14	1.40
b1	.058	.068	1.47	1.73
b2	.100	.110	2.54	2.79
C	.020	.029	0.51	0.74
D	.819	.840	20.80	21.34
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
L	.780	.840	19.81	21.34
L1	.083	.102	2.11	2.59
Q	.210	.244	5.33	6.20
R	.100	.180	2.54	4.57
S	.660	.690	16.76	17.53
T	.590	.620	14.99	15.75
U	.065	.080	1.65	2.03

All leads and tabs are tin plated



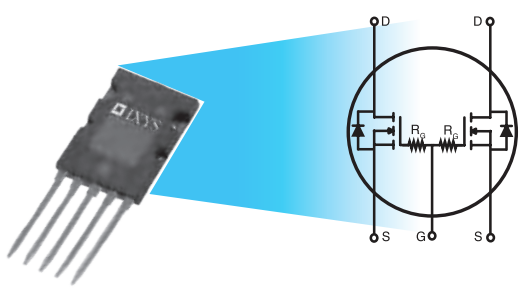
TrenchMV™ Power MOSFETs in 5-lead ISOPLUS i5-Paks™

The principal feature of this subset of TrenchMV Power MOSFETs arises from the high power handling and integration capabilities found in the IXYS discrete ISOPLUS i5-Pak. Standard discrete through-hole packages (i.e. TO-247 or TO-264) are only capable of housing one die due to their inherent spatial, thermal, and structural limitations. The powerful ISOPLUS i5-Pak is used to full effect in this instance by combining its superior isolation, thermal and power cycling capabilities and flexible configuration. In this case, the flexible DCB substrate of the ISOPLUS i5-Pak is patterned to accommodate two common-gate high current TrenchMV dice, allowing users to harness up to 280A out of the device with two parellel-connected die. The use of two parellel die provides for lower on-state loses due to improved thermal distribution.



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.055	1.17	1.40
b	.045	.055	1.14	1.40
b1	.063	.072	1.60	1.83
b2	.100	.110	2.54	2.79
b3	.058	.068	1.47	1.73
c	.020	.029	0.51	0.74
D	1.020	1.040	25.91	26.42
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
L	.780	.820	19.81	20.83
L1	080	102	2.03	2.59
Q	.210	.235	5.33	5.97
Q1	.490	.513	12.45	13.03
R	150	.180	3.81	4.57
R1	.100	.130	2.54	3.30
S	668	.690	16.97	17.53
T	.801	.821	20.34	20.85
U	.065	.080	1.65	2.03

All leads and tabs are tin plated



TrenchMV™ (55V-100V) Power MOSFETs

Part Number	V_{DSS} Max (V)	$I_{D\ (cont)}$ T_C=25°C (A)	$R_{DS(on)}$ Max T_c=25°C (Ω)	C_{iss} Typ (pF)	Q_g Typ (nC)	t_{rr} Typ (ns)	R_{thJC} Max (°C/W)	Pd (W)	Package Type
IXTP64N055T	55	64	0.0130	1420	37	30	1.15	130	TO-220
IXTY64N055T	55	64	0.0130	1420	37	30	1.15	130	TO-252
IXTA90N055T	55	90	0.0088	2500	61	70	0.85	176	TO-263
IXTP90N055T	55	90	0.0088	2500	61	70	0.85	176	TO-220
IXTA110N055T	55	110	0.0070	3080	67	70	0.65	230	TO-263
IXTA110N055T7	55	110	0.0070	3080	67	70	0.65	230	7-Lead D2-Pak
IXTC110N055T	55	78	0.0090	3080	67	70	1.50	100	ISOPLUS220
IXTP110N055T	55	110	0.0070	3080	67	70	0.65	230	TO-220
IXTA182N055T	55	182	0.0050	4850	114	70	0.42	360	TO-263
IXTA182N055T7	55	182	0.0050	4850	114	70	0.42	360	7-Lead D2-Pak
IXTH182N055T	55	182	0.0050	4850	114	70	0.42	360	TO-247
IXTP182N055T	55	182	0.0050	4850	114	70	0.42	360	TO-220
IXTQ182N055T	55	182	0.0050	4850	114	70	0.42	360	TO-3P
IXTA220N055T	55	220	0.0040	7200	158	70	0.35	430	TO-263
IXTA220N055T7	55	220	0.0040	7200	158	70	0.35	430	7-Lead D2-Pak
IXTC220N055T	55	130	0.0044	7200	158	30	1.00	150	ISOPLUS220
IXTH220N055T	55	220	0.0040	7200	158	70	0.35	430	TO-247
IXTP220N055T	55	220	0.0040	7200	158	70	0.35	430	TO-220
IXTQ220N055T	55	220	0.0040	7200	158	70	0.35	430	TO-3P
IXTA240N055T	55	240	0.0036	7600	170	70	0.31	480	TO-263
IXTA240N055T7	55	240	0.0036	7600	170	70	0.31	480	7-Lead D2-Pak
IXTC240N055T	55	132	0.0040	7600	170	30	1.00	150	ISOPLUS220
IXTH240N055T	55	240	0.0036	7600	170	70	0.31	480	TO-247
IXTP240N055T	55	240	0.0036	7600	170	70	0.31	480	TO-220
IXTQ240N055T	55	240	0.0036	7600	170	70	0.31	480	TO-3P
IXTC280N055T	55	145	0.0036	9800	200	30	0.96	160	ISOPLUS220
IXTF280N055T	55	160	0.0040	9800	200	40	0.75	200	ISOPLUS i4-Pak
IXTH280N055T	55	280	0.0032	9800	200	70	0.27	550	TO-247
IXTQ280N055T	55	280	0.0032	9800	200	70	0.27	550	TO-3P
IXTV280N055T	55	280	0.0032	9800	200	70	0.27	550	PLUS220
IXTV280N055TS	55	280	0.0032	9800	200	70	0.27	550	PLUS220SMD
IXTL2x240N055T	55	2x140	0.0044	7600	170	40	1.00	150	ISOPLUS i5-Pak
IXTP55N075T	75	55	0.0195	1400	33	50	1.15	130	TO-220
IXTY55N075T	75	55	0.0195	1400	33	50	1.15	130	TO-252
IXTA76N075T	75	76	0.0120	2580	57	80	0.85	176	TO-263
IXTP76N075T	75	76	0.0120	2580	57	80	0.85	176	TO-220
IXTA98N075T	75	98	0.0100	3100	80	100	0.75	200	TO-263
IXTA98N075T7	75	98	0.0100	3100	80	100	0.75	200	7-Lead D2-Pak
IXTP98N075T	75	98	0.0100	3100	80	100	0.75	200	TO-220
IXTA160N075T	75	160	0.0060	4950	112	80	0.42	360	TO-263
IXTA160N075T7	75	160	0.0060	4950	112	80	0.42	360	7-Lead D2-Pak
IXTH160N075T	75	160	0.0060	4950	112	80	0.42	360	TO-247
IXTP160N075T	75	160	0.0060	4950	112	80	0.42	360	TO-220
IXTQ160N075T	75	160	0.0060	4950	112	80	0.42	360	TO-3P
IXTA200N075T	75	200	0.0050	6800	160	80	0.35	430	TO-263
IXTA200N075T7	75	200	0.0050	6800	160	80	0.35	430	7-Lead D2-Pak
IXTC200N075T	75	110	0.0055	6800	160	80	1.00	150	ISOPLUS220
IXTH200N075T	75	200	0.0050	6800	160	50	0.35	430	TO-247
IXTP200N075T	75	200	0.0050	6800	160	80	0.35	430	TO-220
IXTQ200N075T	75	200	0.0050	6800	160	50	0.35	430	TO-3P
IXTA220N075T	75	220	0.0045	7700	165	80	0.31	480	TO-263
IXTA220N075T7	75	220	0.0045	7700	165	80	0.31	480	7-Lead D2-Pak
IXTC220N075T	75	115	0.0050	7700	165	50	1.00	150	ISOPLUS220
IXTH220N075T	75	220	0.0045	7700	165	80	0.31	480	TO-247
IXTP220N075T	75	220	0.0045	7700	165	80	0.31	480	TO-220
IXTQ220N075T	75	220	0.0045	7700	165	80	0.31	480	TO-3P
IXTC250N075T	75	128	0.0044	9900	200	90	0.96	160	ISOPLUS220
IXTF250N075T	75	140	0.0044	9900	200	50	0.75	200	ISOPLUS i4-Pak
IXTH250N075T	75	250	0.0040	9900	200	80	0.27	550	TO-247
IXTQ250N075T	75	250	0.0040	9900	200	80	0.27	550	TO-3P
IXTV250N075T	75	250	0.0040	9900	200	80	0.27	550	PLUS220
IXTV250N075TS	75	250	0.0040	9900	200	80	0.27	550	PLUS220SMD
IXTL2x220N075T	75	2x120	0.0055	7700	165	50	1.00	150	ISOPLUS i5-Pak

Type A
TO-263
(D2-Pak)



Type A ...7
7-Lead D2-Pak



Type C
ISOPLUS220™



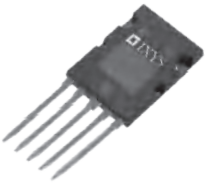
Type F
ISOPLUS i4-Pak™



Type H
TO-247



Type L
ISOPLUS264™
(ISOPLUS i5-Pak™)



TrenchMV™ (55V-100V) Power MOSFETs (cont.)

Part Number	V_{DSS} Max (V)	$I_{D\ (cont)}$ T_C=25°C (A)	$R_{DS(on)}$ Max T_c=25°C (Ω)	C_{iss} Typ (pF)	Q_g Typ (nC)	t_{rr} Typ (ns)	R_{thJC} Max (°C/W)	Pd (W)	Package Type
IXTP50N085T	85	50	0.0230	1460	34	55	1.15	130	TO-220
IXTY50N085T	85	50	0.0230	1460	34	55	1.15	130	TO-252
IXTA70N085T	85	70	0.0135	2570	59	90	0.85	176	TO-263
IXTP70N085T	85	70	0.0135	2570	59	90	0.85	176	TO-220
IXTA88N085T	85	88	0.0110	3140	69	90	0.65	230	TO-263
IXTA88N085T7	85	88	0.0110	3140	69	90	0.65	230	7-Lead D2-Pak
IXTP88N085T	85	88	0.0110	3140	69	90	0.65	230	TO-220
IXTA152N085T	85	152	0.0070	5500	114	90	0.42	360	TO-263
IXTA152N085T7	85	152	0.0070	5500	114	90	0.42	360	7-Lead D2-Pak
IXTH152N085T	85	152	0.0070	5500	114	90	0.42	360	TO-247
IXTP152N085T	85	152	0.0070	5500	114	90	0.42	360	TO-220
IXTQ152N085T	85	152	0.0070	5500	114	90	0.42	360	TO-3P
IXTA180N085T	85	180	0.0055	7500	170	90	0.35	430	TO-263
IXTA180N085T7	85	180	0.0055	7500	170	90	0.35	430	7-Lead D2-Pak
IXTC180N085T	85	110	0.0061	7500	170	90	1.00	150	ISOPLUS220
IXTH180N085T	85	180	0.0055	7500	170	90	0.35	430	TO-247
IXTP180N085T	85	180	0.0055	7500	170	90	0.35	430	TO-220
IXTQ180N085T	85	180	0.0055	7500	170	90	0.35	430	TO-3P
IXTA200N085T	85	200	0.0050	7600	152	90	0.31	480	TO-263
IXTA200N085T7	85	200	0.0050	7600	152	90	0.31	480	7-Lead D2-Pak
IXTC200N085T	85	110	0.0055	7600	160	90	1.00	150	ISOPLUS220
IXTH200N085T	85	200	0.0050	7600	152	90	0.31	480	TO-247
IXTP200N085T	85	200	0.0050	7600	152	90	0.31	480	TO-220
IXTQ200N085T	85	200	0.0050	7600	152	90	0.31	480	TO-3P
IXTC230N085T	85	120	0.0053	9900	187	90	0.96	160	ISOPLUS220
IXTF230N085T	85	130	0.0053	9900	187	60	0.75	200	ISOPLUS i4-Pak
IXTH230N085T	85	230	0.0044	9900	187	90	0.27	550	TO-247
IXTQ230N085T	85	230	0.0044	9900	187	90	0.27	550	TO-3P
IXTV230N085T	85	230	0.0044	9900	187	90	0.27	550	PLUS220
IXTV230N85TS	85	230	0.0044	9900	187	90	0.27	550	PLUS220SMD
IXTL2x200N085T	85	2x112	0.0060	7600	152	55	1.00	150	ISOPLUS i5-Pak
IXTP44N10T	100	44	0.0300	1262	33	100	1.15	130	TO-220
IXTY44N10T	100	44	0.0300	1262	33	100	1.15	130	TO-252
IXTA60N10T	100	60	0.0180	2520	49	100	0.85	176	TO-263
IXTP60N10T	100	60	0.0180	2520	49	100	0.85	176	TO-220
IXTA80N10T	100	80	0.0140	3040	60	100	0.65	230	TO-263
IXTA80N10T7	100	80	0.0140	3040	60	100	0.65	230	7-Lead D2-Pak
IXTP80N10T	100	80	0.0140	3040	60	100	0.65	230	TO-220
IXTA130N10T	100	130	0.0085	4800	104	100	0.42	360	TO-263
IXTA130N10T7	100	130	0.0085	4800	104	100	0.42	360	7-Lead D2-Pak
IXTH130N10T	100	130	0.0085	4800	104	100	0.42	360	TO-247
IXTP130N10T	100	130	0.0085	4800	104	100	0.42	360	TO-220
IXTQ130N10T	100	130	0.0085	4800	104	100	0.42	360	TO-3P
IXTA160N10T	100	160	0.0070	6600	132	60	0.35	430	TO-263
IXTA160N10T7	100	160	0.0070	6600	132	100	0.35	430	7-Lead D2-Pak
IXTC160N10T	100	83	0.0075	6600	132	60	1.06	140	ISOPLUS220
IXTH160N10T	100	160	0.0070	6600	132	100	0.35	430	TO-247
IXTP160N10T	100	160	0.0070	6600	132	60	0.35	430	TO-220
IXTQ160N10T	100	160	0.0070	6600	132	100	0.35	430	TO-3P
IXTA180N10T	100	180	0.0064	6900	151	60	0.31	480	TO-263
IXTA180N10T7	100	180	0.0064	6900	151	100	0.31	480	7-Lead D2-Pak
IXTC180N10T	100	90	0.0070	6900	151	100	1.00	150	ISOPLUS220
IXTH180N10T	100	180	0.0064	6900	151	100	0.31	480	TO-247
IXTP180N10T	100	180	0.0064	6900	151	60	0.31	480	TO-220
IXTQ180N10T	100	180	0.0064	6900	151	100	0.31	480	TO-3P
IXTC200N10T	100	101	0.0063	7200	220	130	0.96	160	ISOPLUS220
IXTF200N10T	100	120	0.0063	8500	152	80	0.75	200	ISOPLUS i4-Pak
IXTH200N10T	100	200	0.0055	8500	152	100	0.27	550	TO-247
IXTN200N10T	100	200	0.0054	7200	220	130	0.30	500	SOT-227B
IXTQ200N10T	100	200	0.0055	8500	152	100	0.27	550	TO-3P
IXTV200N10T	100	200	0.0055	8500	152	100	0.27	550	PLUS220
IXTV200N10TS	100	200	0.0055	8500	152	100	0.27	550	PLUS220SMD
IXTL2x180N10T	100	2x100	0.0074	6900	151	60	1.00	150	ISOPLUS i5-Pak

Type P
TO-22(



Type Q
TO-3P



Types V,
PLUS220



Type V ...S
PLUS220SMD



Type Y
TO-252
(D-Pak)



• TrenchMV, ISOPLUS, ISOPLUS220, ISOPLUS264, ISOPLUS i4-Pak and ISOPLUS i5-Pak are trademarks of IXYS Corporation. SIL-PAD is a trademark of Berquist Co.