

High Voltage IGBT Modules (HV-IGBT)



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Features

- Highest Reliability in Material and Processes: Improvement of power cycling capability
- Highest Quality Controls:
 - Static and switching tests
 - 100% shipping inspection
- HV-IGBT modules and complementary HV-Diodes are available in rated voltages of 1.7kV, 2.5kV, 3.3kV, 4.5kV, 6.5kV and rated currents ranging from 200A to 2400A
- 1.7kV HV-IGBT modules with Light Punch Through Carrier Stored Trench Gate Bipolar Transistor (LPT-CSTBT™) technology and a new free-wheel diode design for reduced IGBT losses and suppressed diode oscillation
- 4.5kV, 6.5kV class HV-IGBTs with LPT chip structure to provide low loss performance and wide RBSOA
- 3.3kV, 4.5kV & 6.5kV HV-IGBT modules and diodes with 10.2kV isolated package available
- New 3.3kV, 4.5kV, 6.5kV R-Series IGBT Modules
 - Low loss performance
 - Increased terminal torque capability to 22Nm
 - 10.2kV high isolation package available on request
 - Extended maximum operating temperature and minimum storage temperature up to 150°C and -55°C respectively
 - High Robustness (Wide SOA)

4

Ihr Vertriebspartner:
HY-LINE[®]
 POWER COMPONENTS

Inselkammerstraße 10
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 Tel.: +49 (0)89 614503 10
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 E-Mail: power@hy-line.de
 URL: www.hy-line.de

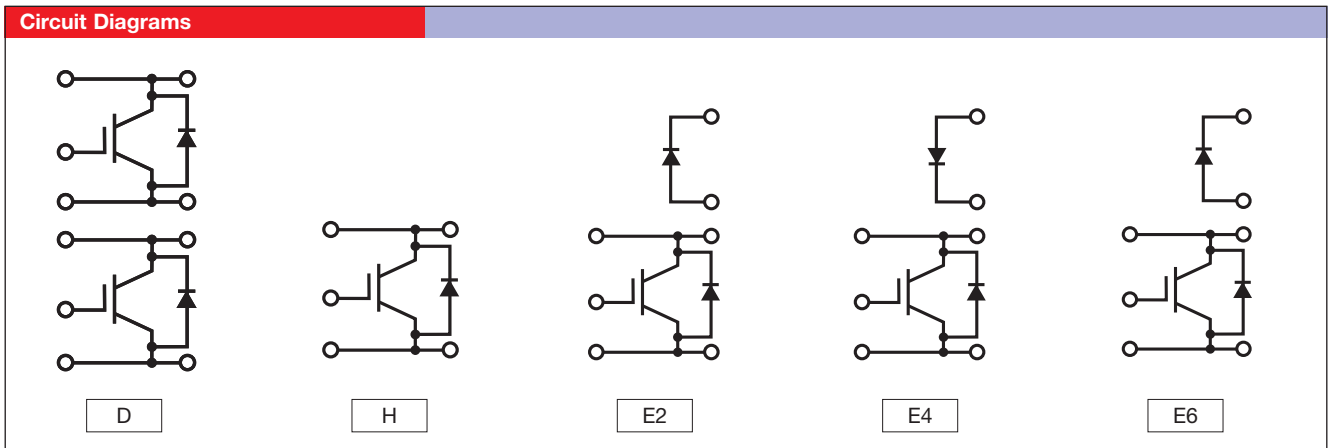
4.01 High Voltage IGBT Modules (HV-IGBT)

Line-up HV-IGBTs

V _{CEs} (V)	Generation & Base Plate Material	Configu- ration	I _c (A)																						
			200	400	600	750	800	900	1000	1200	1500	1600	1800	2400											
1700	G1 (Cu)	Single			CM800HA-34H																				
		Dual			CM600DY-34H																				
		Chopper			CM600E2Y-34H																				
	G3 (ASiC)	Single																					CM2400HC-34H		
		Dual					CM800DZ-34H CM800DZB-34H ²																		
		Dual																							
	G4 (ASiC)	Single																						CM1800HC-34N ² CM1800HCB-34N ²	
		Dual																							
		Dual																							
	2500	G1 (Cu)	Single																						
Dual																									
Chopper																									
G2 (Cu)		Single																							
		Single																							
		Single																							
G3 (ASiC)		Single																							
		Dual																							
		Chopper																							
3300		G1 (Cu)	Single																						
	Dual																								
	Chopper																								
	G2 (Cu)	Single																							
		Single																							
		Single																							
	G3 (ASiC)	Single																							
		Dual																							
		Chopper																							
	4500	G2 (Cu)	Single																						
Single																									
Chopper																									
G3 (ASiC)		Single																							
		Single																							
		Chopper																							
G3 (ASiC)		Single																							
		Single																							
		Chopper																							

¹ Under Development ² CSTBT™ Chip Technology ³ High Isolation Package (10.2kV_{rms}) ⁴New R-Series

4.01 High Voltage IGBT Modules (HV-IGBT)



For detailed connections please refer data sheet.

Package Symbol	Type Number	Maximum Ratings			Electrical Characteristics				Free Wheel Diode		Thermal & Mechanical Characteristics			Package-No.
		V _{CES} (V)	I _C (A)	V _{iso} (V)	V _{CE(sat)} @ T _j = 25°C (V)		E _{on} @ T _j = 125°C (J/P)	E _{off} @ T _j = 125°C (J/P)	V _f @ T _j = 25°C (V)	E _{rr} @ T _j = 125°C (J/P)	IGBT R _{th(j-c)} (K/W)	Diode R _{th(j-c)} (K/W)	R _{th(c-f)} (K/W)	
					Typ.	Max.	Typ.	Typ.	Typ.	Typ.	Max.	Max.	Max.	
1700 Volt HV-IGBT Modules														
D	CM600DY-34H	1700	600	4000	2.75	3.58	0.28	0.15	2.4	0.09	0.0180	0.056	0.016	HV2
	CM800DZ-34H	1700	800	4000	2.60	3.30	0.35	0.26	2.3	0.12	0.0200	0.034	0.016	HV2
	CM800DZB-34N	1700	800	4000	2.10	2.70	0.30	0.20	2.2	0.18	0.0240	0.036	0.018	HV2
	CM1200DC-34N	1700	1200	4000	2.15	2.80	0.38	0.36	2.6	0.22	0.0190	0.042	0.016	HV10
	CM1200DB-34N	1700	1200	4000	2.15	2.80	0.38	0.36	2.6	0.22	0.0180	0.04	0.016	HV10
H	CM800HA-34H	1700	800	4000	2.75	3.58	0.30	0.30	2.4	0.15	0.0135	0.042	0.012	HV1
	CM1200HA-34H	1700	1200	4000	2.75	3.58	0.45	0.45	2.4	0.22	0.0090	0.028	0.008	HV1
	CM1200HC-34H	1700	1200	4000	2.50	3.25	0.40	0.44	2.25	0.18	0.0120	0.020	0.010	HV1
	CM1200HCB-34N	1700	1200	4000	2.05	2.70	0.43	0.32	2.2	0.29	0.0140	0.021	0.010	HV7
	CM1600HC-34H	1700	1600	4000	2.60	3.30	0.54	0.58	2.3	0.22	0.0100	0.017	0.008	HV1
	CM1800HC-34H	1700	1800	4000	2.40	3.10	0.59	0.67	2.2	0.26	0.0080	0.013	0.007	HV4
	CM1800HC-34N	1700	1800	4000	2.15	2.80	0.55	0.56	2.6	0.28	0.0125	0.028	0.011	HV12
	CM1800HCB-34N	1700	1800	4000	2.00	2.60	0.56	0.50	2.1	0.44	0.0090	0.013	0.007	HV4
	CM2400HC-34H	1700	2400	4000	2.60	3.30	0.81	0.87	2.3	0.33	0.0070	0.012	0.006	HV4
	CM2400HC-34N	1700	2400	4000	2.15	2.80	0.64	0.84	2.6	0.38	0.0095	0.021	0.008	HV12
CM2400HCB-34N	1700	2400	4000	2.10	2.70	0.65	0.70	2.20	0.50	0.0080	0.012	0.006	HV4	
E2	CM600E2Y-34H	1700	600	4000	2.75	3.58	0.28	0.15	2.40	0.09	0.0180	0.056	0.016	HV13
E4	CM1200E4C-34N	1700	1200	4000	2.15	2.80	0.38	0.36	2.60	0.22	0.0190	0.042	0.016	HV12
2500 Volt HV-IGBT Modules														
D	CM400DY-50H	2500	400	6000	3.20	4.16	0.50	0.40	2.90	0.11	0.036	0.072	0.016	HV3
H	CM800HA-50H	2500	800	6000	3.20	4.16	1.00	0.80	2.90	0.21	0.018	0.036	0.008	HV5
	CM800HB-50H	2500	800	6000	2.80	3.64	0.80	0.86	2.50	0.33	0.012	0.024	0.008	HV7
	CM1200HA-50H	2500	1200	6000	3.20	4.16	1.50	1.20	2.90	0.31	0.012	0.024	0.006	HV6
	CM1200HB-50H	2500	1200	6000	2.80	3.64	1.20	1.29	2.50	0.45	0.008	0.016	0.006	HV4
	CM1200HC-50H	2500	1200	6000	2.80	3.60	1.30	1.20	2.50	0.45	0.0085	0.017	0.006	HV4

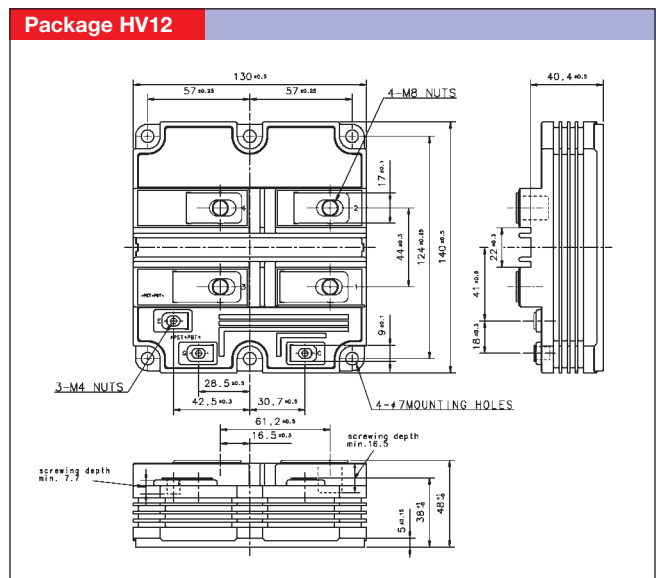
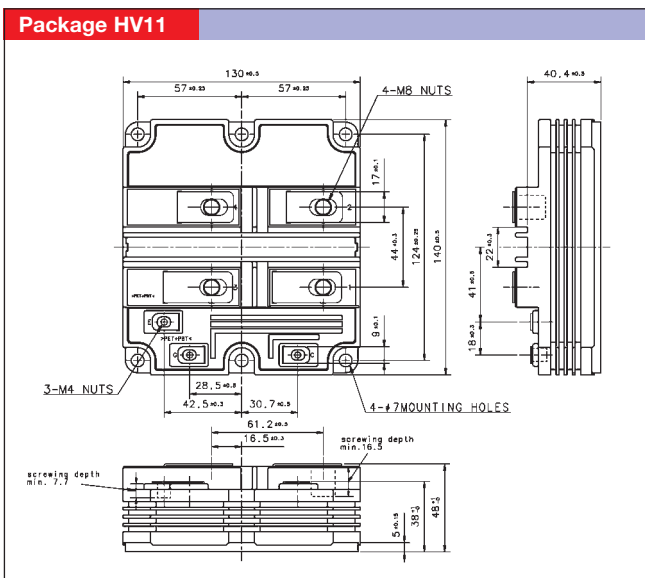
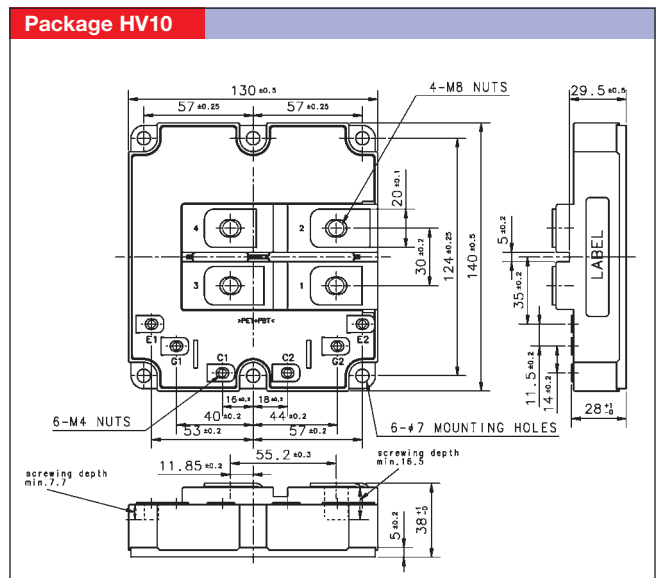
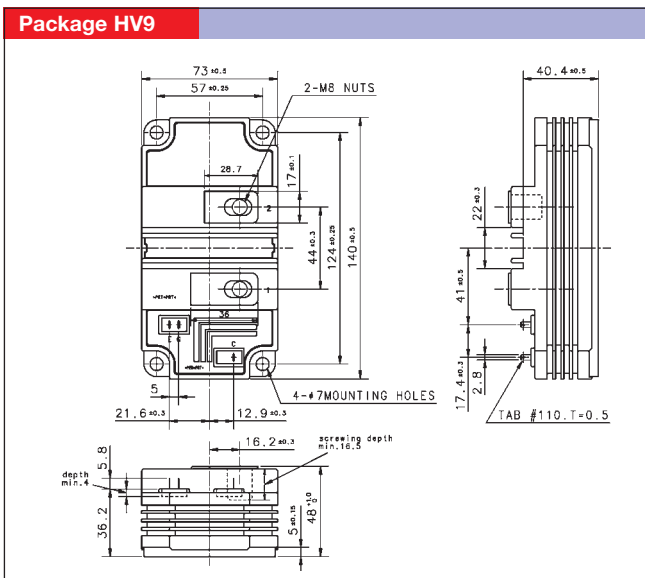
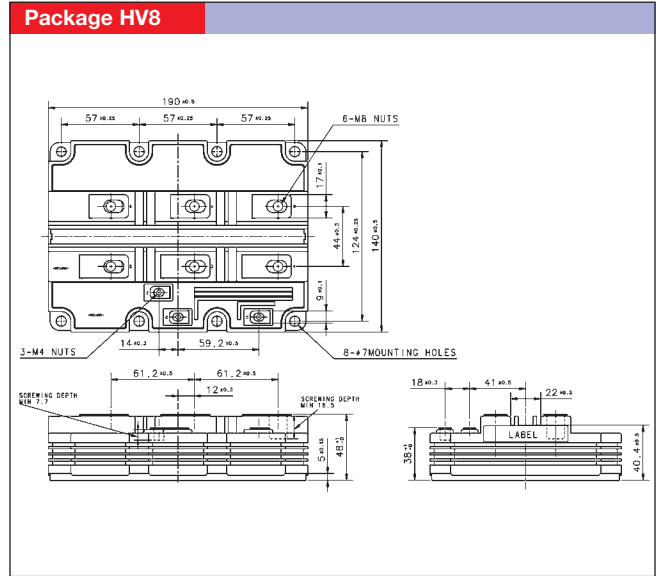
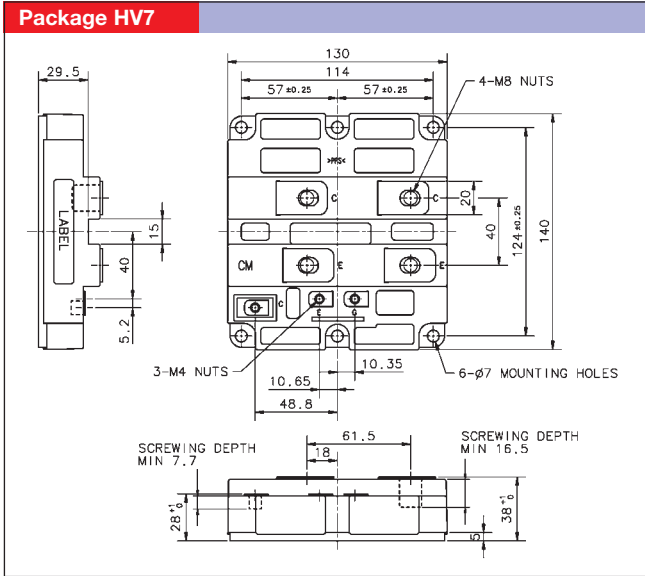
4.01 High Voltage IGBT Modules (HV-IGBT)

Package Symbol	Type Number	Maximum Ratings			Electrical Characteristics				Free Wheel Diode		Thermal & Mechanical Characteristics			Package-No.
		V _{CES} (V)	I _C (A)	V _{iso} (V)	V _{CE(sat)} @ T _j = 25°C (V)		E _{on} @ T _j = 125°C (J/P)	E _{off} @ T _j = 125°C (J/P)	V _f @ T _j = 25°C (V)	E _{rr} @ T _j = 125°C (J/P)	IGBT R _{th(j-c)} (K/W)	Diode R _{th(j-c)} (K/W)	R _{th(c-f)} (K/W)	
					Typ.	Max.	Typ.	Typ.	Typ.	Typ.	Max.	Max.	Max.	
3300 Volt HV-IGBT Modules														
D	CM400DY-66H	3300	400	6000	4.40	5.72	0.67	0.40	3.30	0.17	0.036	0.072	0.016	HV3
H	CM400HG-66H	3300	400	10200	3.30		0.59	0.52	2.80	0.30	0.027	0.0525	0.018	HV9
	CM800HA-66H	3300	800	6000	4.40	5.72	1.60	0.80	3.30	0.33	0.018	0.036	0.008	HV5
	CM800HB-66H	3300	800	6000	3.80	4.94	1.20	0.96	2.80	0.47	0.012	0.024	0.008	HV7
	CM800HC-66H	3300	800	6000	3.30	4.20	1.10	1.05	2.80	0.60	0.013	0.025	0.008	HV7
	CM1000HC-66R	3300	1000	6000	2.45		1.85	1.65	2.15	1.20	0.012	0.0225	0.009	HV14
	CM1200HA-66H	3300	1200	6000	4.40	5.72	2.00	1.20	3.30	0.50	0.012	0.024	0.006	HV6
	CM1200HB-66H	3300	1200	6000	3.80	4.94	1.80	1.44	2.80	0.70	0.008	0.016	0.006	HV4
	CM1200HC-66H	3300	1200	6000	3.30	4.20	1.60	1.55	2.80	0.90	0.0085	0.017	0.006	HV4
	CM1200HG-66H	3300	1200	10200	3.30		1.60	1.55	2.80	0.90	0.009	0.0175	0.006	HV8
	CM1500HC-66R	3300	1500	6000	2.45		2.75	2.45	2.15	1.75	0.008	0.015	0.006	HV15
	CM1500HG-66R	3300	1500	10200	2.45		2.75	2.45	2.15	1.75	0.0085	0.0155	0.006	HV16
E2	CM800E2C-66H	3300	800	6000	3.80	4.94	1.20	0.96	2.80	0.47	0.013	0.025	0.008	HV4
E4	CM800E4C-66H	3300	800	6000	3.30		1.10	1.05	2.80	0.60	0.013	0.025	0.006	HV4
	CM1000E4C-66R	3300	1000	6000	2.45		1.85	1.65	2.15	1.20	0.012	0.0225	0.007	HV15
E6	CM800E6C-66H	3300	800	6000	3.30	4.20	1.10	1.05	2.80	0.60	0.013	0.025	0.008	HV4
4500 Volt HV-IGBT Modules														
H	CM400HB-90H	4500	400	6000	3.00	3.90	2.00	1.20	4.00	0.28	0.021	0.042	0.015	HV7
	CM600HB-90H	4500	600	6000	3.00	3.90	2.80	1.80	4.00	0.42	0.0135	0.027	0.010	HV7
	CM600HG-90H	4500	600	10200	3.45		2.80	1.70	4.80	0.67	0.0165	0.033	0.009	HV11
	CM800HC-90R	4500	800	10200	3.50		3.15	2.60	2.60	1.50	0.015	0.0285	0.009	HV14
	CM800HG-90R	4500	800	10200	3.50		3.15	2.60	2.60	1.50	0.016	0.0295	0.009	HV17
	CM900HB-90H	4500	900	6000	3.00	3.90	4.00	2.70	4.00	0.88	0.009	0.018	0.007	HV4
	CM900HC-90H	4500	900	6000	3.45		4.20	2.50	4.80	1.00	0.0105	0.021	0.006	HV4
	CM900HG-90H	4500	900	10200	3.45		4.20	2.50	4.80	1.00	0.011	0.022	0.006	HV8
	CM1200HC-90R	4500	1200	6000	3.50		4.70	3.85	2.60	2.25	0.010	0.019	0.006	HV15
	CM1200HG-90R	4500	1200	10200	3.50		4.70	3.85	2.60	2.25	0.0105	0.0195	0.006	HV16
6500 Volt HV-IGBT Modules														
H	CM200HG-130H	6500	200	10200	4.5		1.50	1.20	4.0	0.70	0.042	0.066	0.018	HV9
	CM400HG-130H	6500	400	10200	4.5		3.00	2.70	4.0	1.40	0.021	0.033	0.009	HV11
	CM600HG-130H	6500	600	10200	4.5		4.50	4.30	4.0	2.00	0.014	0.022	0.006	HV8
	CM750HG-130R	6500	750	10200	3.9		4.10	4.60	3.0	1.85	0.012	0.022	0.006	HV16
E4	CM400E4G-130H	6500	400	10200	4.5		3.00	2.70	3.8	1.40	0.021	0.033	0.009	HV8

Preliminary Data

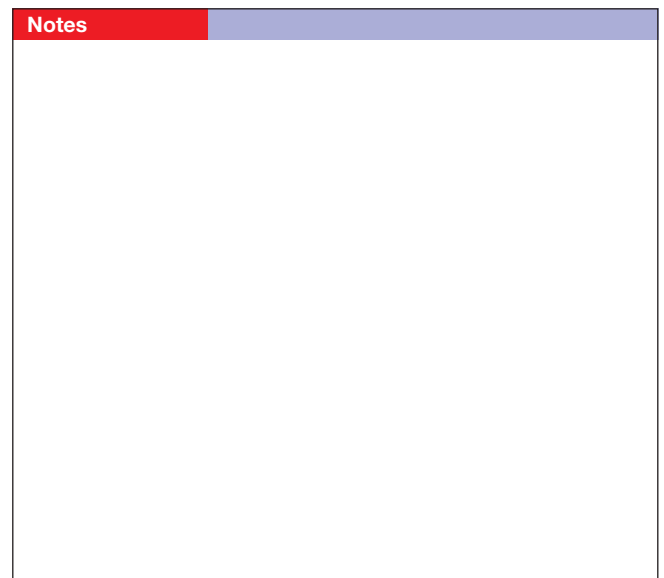
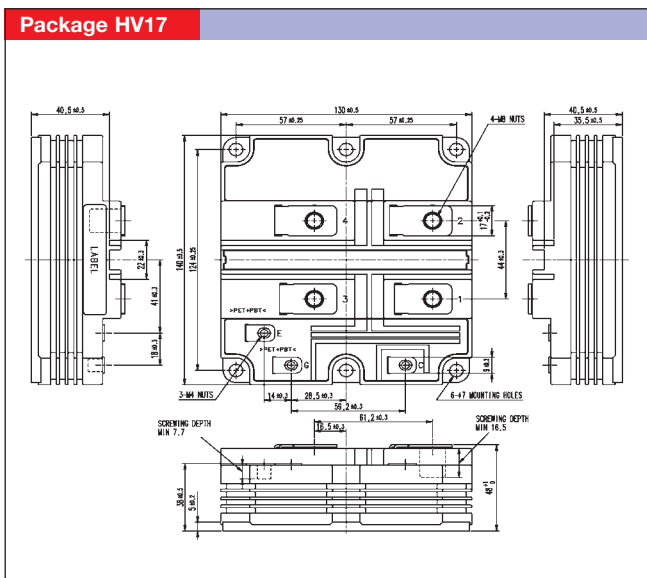
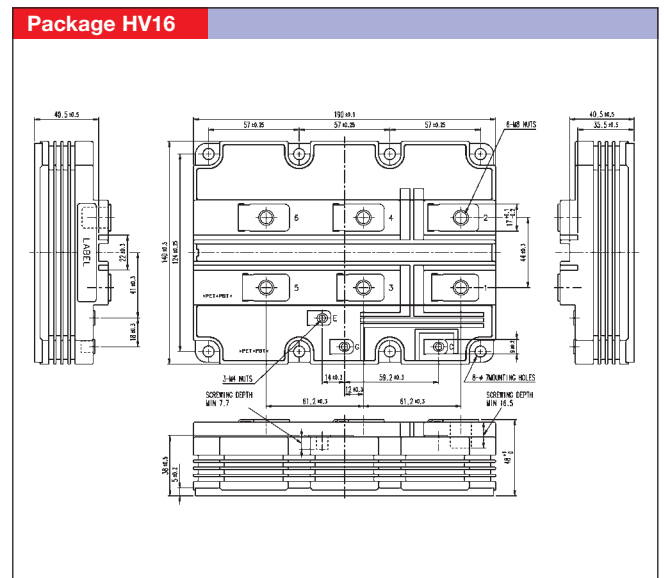
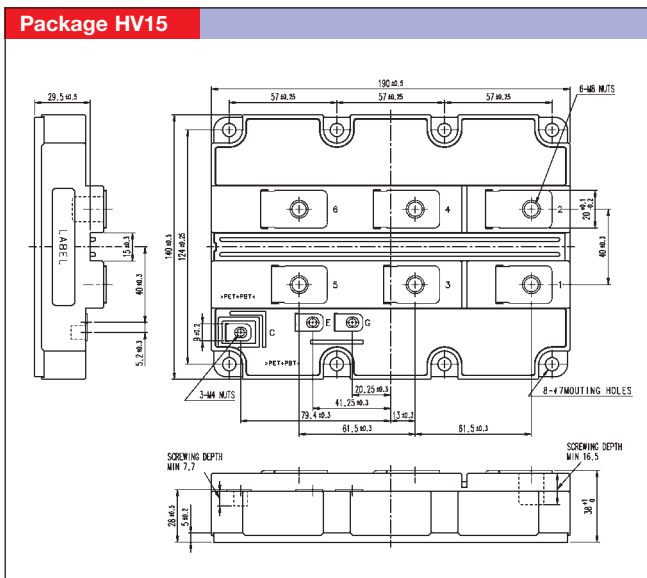
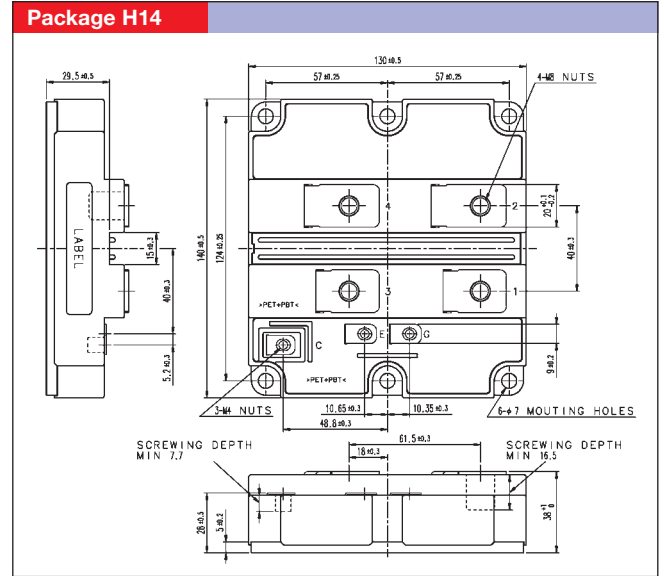
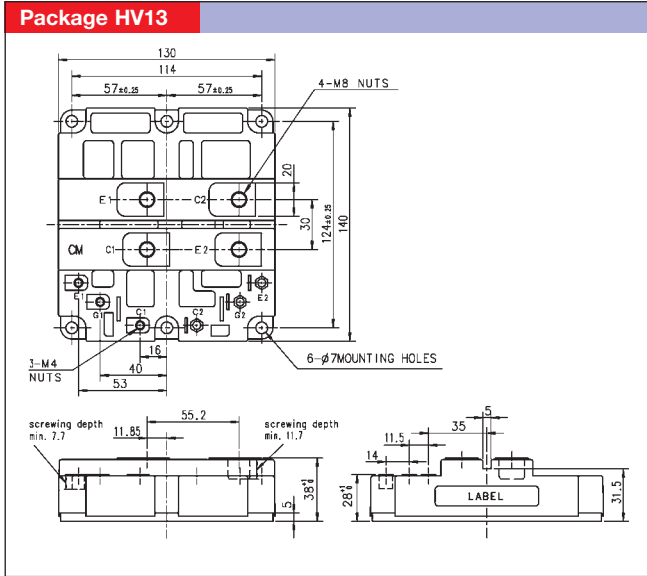
For detail test conditions please refer to data sheets.

4.01 High Voltage IGBT Modules (HV-IGBT)



Dimensions in mm

4.01 High Voltage IGBT Modules (HV-IGBT)



High Voltage Diode Modules



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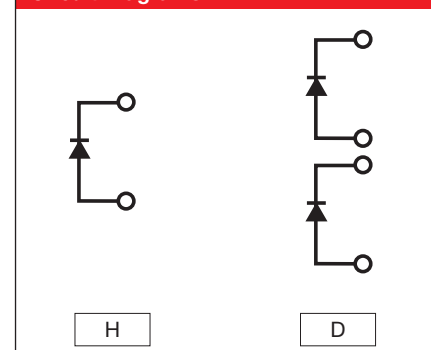
Features

- Complementary to HV-IGBT modules for multilevel inverter designs
- Wide creepage distance between main terminals
- Ease of both installation and connection allows application equipment to be reduced in dimensions and weight



4

Circuit Diagrams



For detailed connections please refer data sheets.

4.02 High Voltage Diode Modules

Line-up HV-Diode Modules

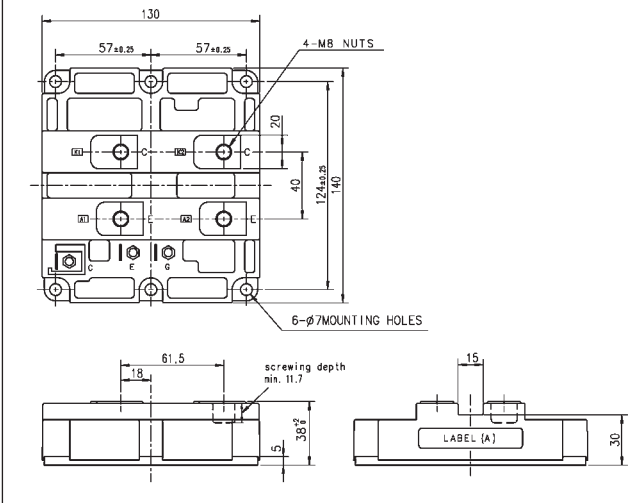
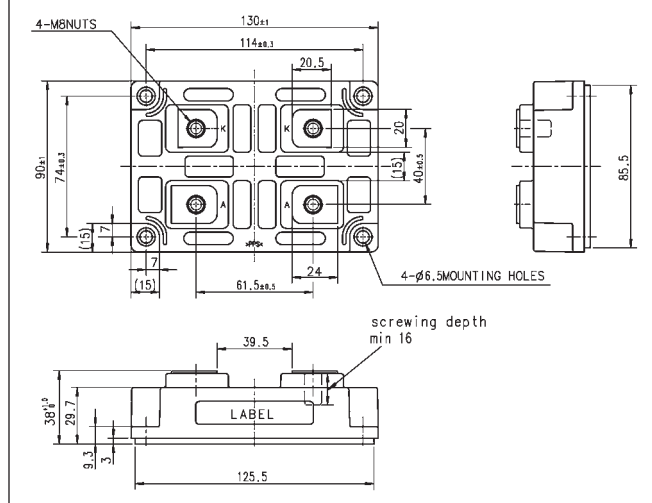
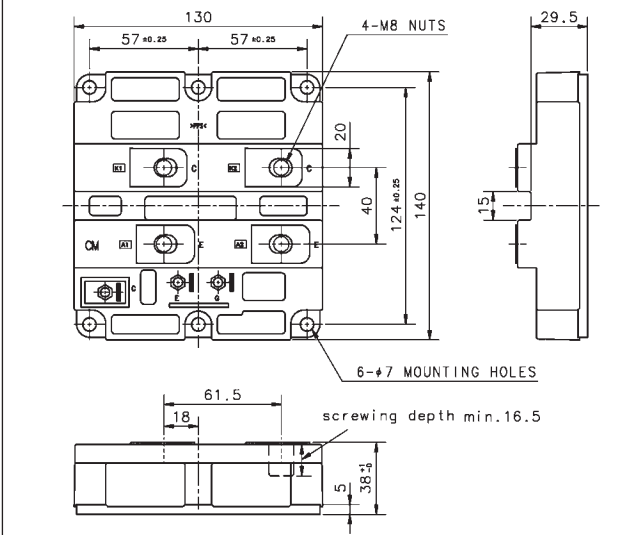
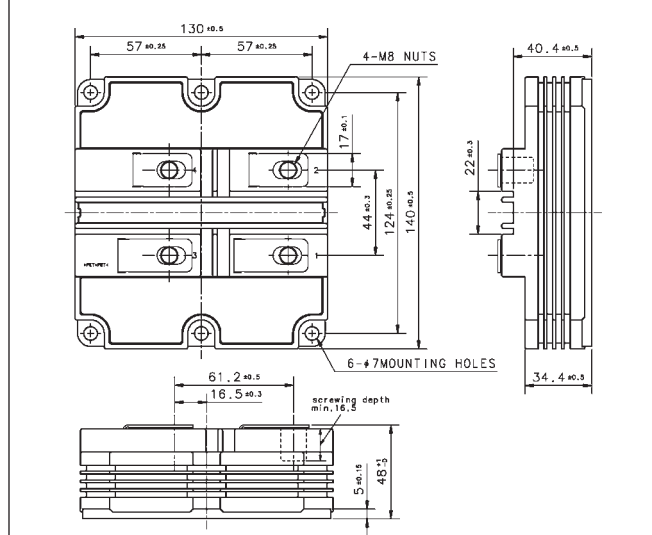
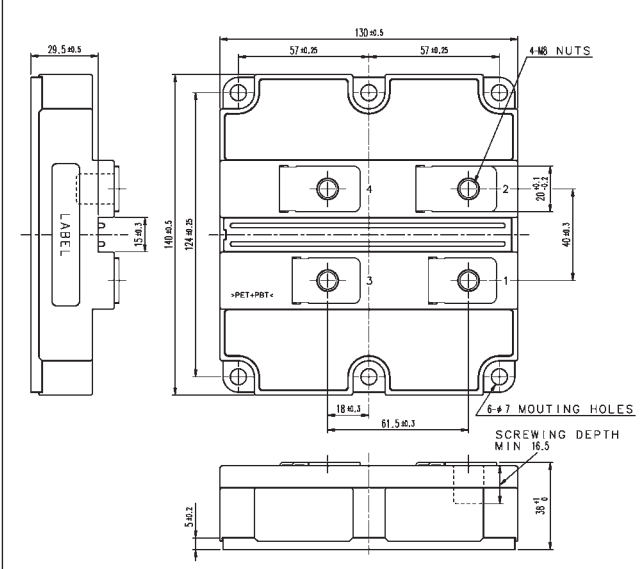
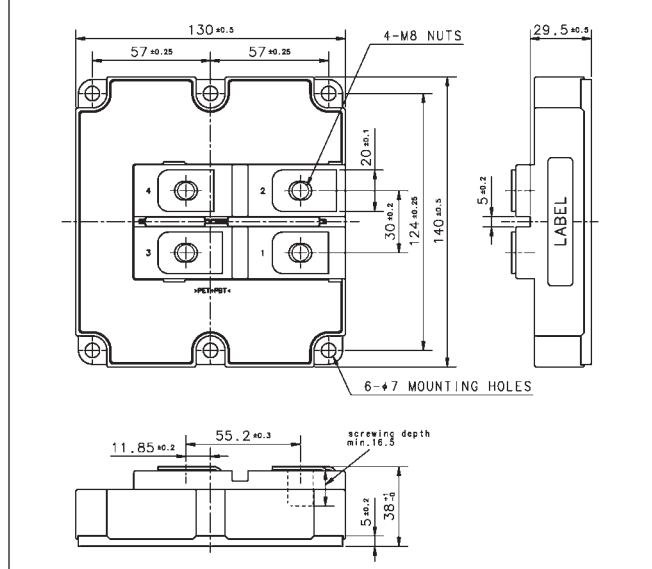
V _{CES} (V)	Generation & Base Plate Material	Con-figuration	I _c (A)										
			200	250	300	400	600	900	1000	1200	1500	1800	
1700	G3 (AlSiC)	Single											RM1800HE-34S
	G3 (Cu)	Dual									RM1200DB-34S		
3300	G1 (Cu)	Dual				RM400DY-66S	RM600DY-66S						
	G2 (Cu)	Dual									RM1200DB-66S		
	G3 (AlSiC)	Single									RM1200HE-66S		
		Dual				RM400DG-66S ¹				RM1000DC-66F ²	RM1200DG-66S ¹	RM1500DC-66F ²	
4500	G2 (Cu)	Dual						RM900DB-90S					
	G3 (AlSiC)	Single						RM600HE-90S					
		Dual				RM300DG-90S ¹	RM400DG-90F ²						
6500	G3 (AlSiC)	Dual	RM200DG-130S ¹	RM250DG-130F ²				RM600DG-130S ¹					

¹High Isolation Package (10.2kV_{rms}) ²New R-Series

Package Symbol	Type Number	Maximum Ratings				Electrical Characteristics				Thermal & Mechanical Characteristics		Package-No.
		V _{RRM} (V)	I _{DC} (A)	V _{ISO} (V)	I _{FSM} (A)	V _{FM} (V) @ T _j = 25°C	E _{rr} (J/P) Typ.	Q _{rr} (μC) Typ.	t _{rr} (μs) Max.	R _{th(j-c)} (K/W)	R _{th(c-f)} (K/W)	
1700 Volt HV-Diode Modules												
D	RM1200DB-34S	1700	1200	4000	20800	2.10	0.30	420	0.85	0.020	0.024	RM6
H	RM1800HE-34S	1700	1800	6000	9600	2.90	0.40	600	0.8	0.022	0.017	RM2
3300 Volt HV-Diode Modules												
D	RM400DY-66S	3300	400	6000	3200	3.75	0.15	200	0.75	0.072	0.036	RM1
	RM400DG-66S	3300	400	10200	3200	2.80	0.30	270	1.00	0.054	0.048	RM4
	RM600DY-66S	3300	600	6000	4800	3.75	0.23	300	0.75	0.048	0.024	RM1
	RM1000DC-66F	3300	1000	6000	9400	2.20	1.20	1150	0.75	0.024	0.026	RM5
	RM1200DB-66S	3300	1200	6000	9600	3.00	0.75	850	0.75	0.018	0.016	RM3
	RM1200DG-66S	3300	1200	10200	9600	3.00	0.90	800	1.00	0.018	0.016	RM4
	RM1500DC-66F	3300	1500	6000	14000	2.20	1.85	1700	0.75	0.016	0.0175	RM5
H	RM1200HE-66S	3300	1200	6000	9600	3.20	0.85	900	1.40	0.020	0.015	RM2
4500 Volt HV-Diode Modules												
D	RM300DG-90S	4500	300	10200	2400	4.80	0.33	250	1.00	0.066	0.048	RM4
	RM400DG-90F	4500	400	10200	3400	2.55	0.75	580	0.90	0.0585	0.048	RM4
	RM900DB-90S	4500	900	6000	6400	4.00	0.70	650	0.90	0.020	0.016	RM3
H	RM600HE-90S	4500	600	6000	4800	4.80	0.62	600	0.90	0.039	0.015	RM2
	RM900HC-90S	4500	900	6000	7200	4.80	1.00	750	1.00	0.021	0.016	RM3
6500 Volt HV-Diode Modules												
D	RM200DG-130S	6500	200	10200	1600	4.00	0.70	300	1.00	0.066	0.048	RM4
	RM250DG-130F	6500	200	10200	2350	3.30	0.80	340	0.60	0.0675	0.048	RM4
	RM600DG-130S	6500	600	10200	4800	4.00	2.00	900	1.00	0.022	0.016	RM4

For detail test conditions please refer to data sheets.

4.02 High Voltage Diode Modules

Package RM1

Package RM2

Package RM3

Package RM4

Package RM5

Package RM6


Dimensions in mm

High Voltage Intelligent Power Modules



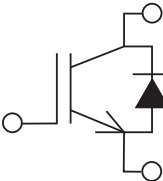
Features

- Highest Reliability in Material and Processes
- Highest Quality Controls:
 - Static and switching tests
 - 100% shipping inspection
- Low $V_{CE(sat)}$ (Typ. 3.05V)
- Combining gate drive and protection circuitry (Over Current, Short Circuit, Over Temperature)
- Optimised isolation design to satisfy 6kV AC
- Designed for high power converters and inverters, medium voltage drives, and traction drives

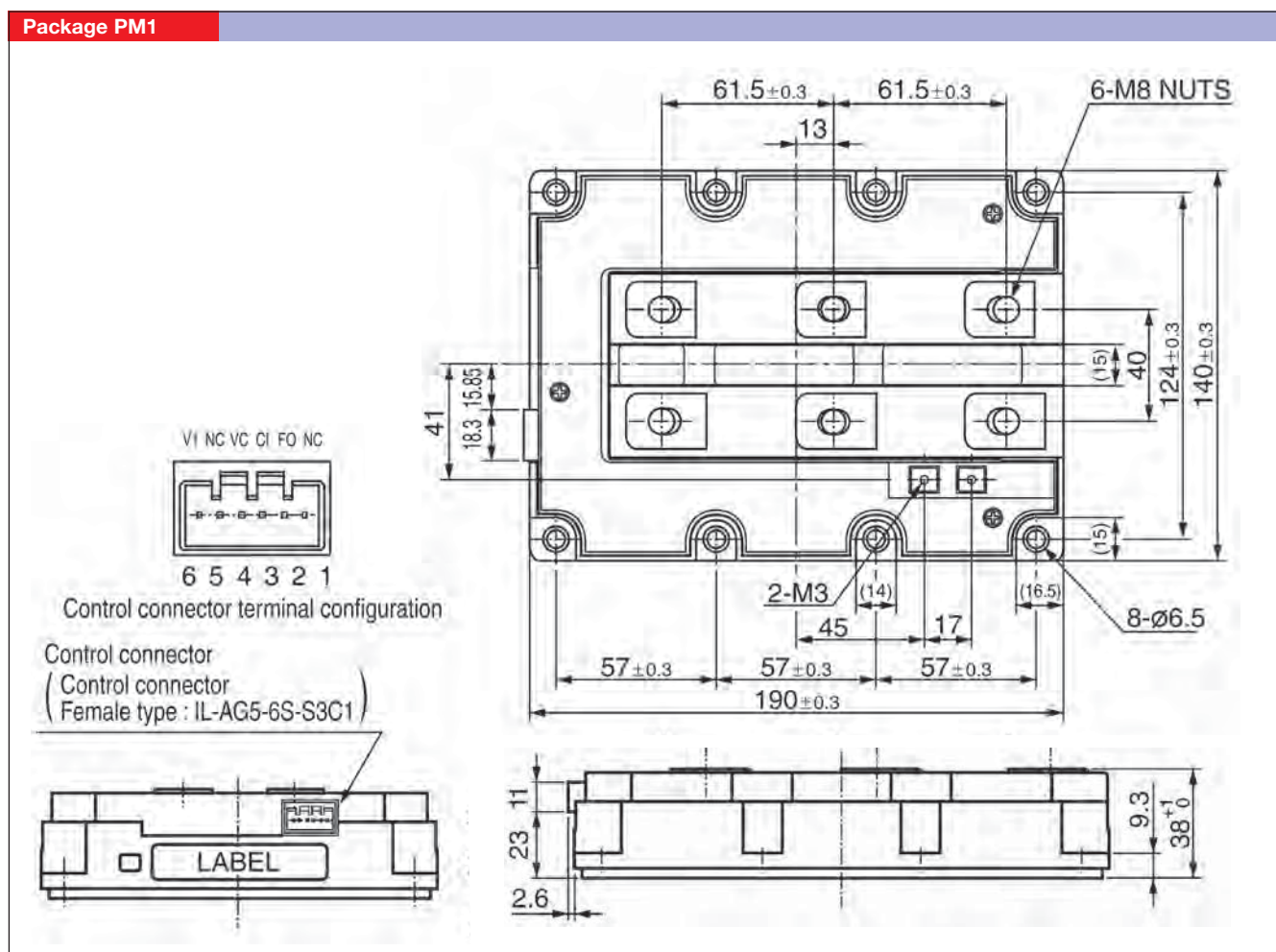


4.03 High Voltage Intelligent Power Modules

Line-up HV-IPM

Configuration	V_{RRM} (V)	I_{bc} (A)
		1200
H 	3300	PM1200HCE330-1

Type Number	Maximum Ratings			Electrical Characteristics					Typical Protection Functions			Thermal Characteristics			Package No.
	V_{CES} (V)	I_c (A)	V_{iso} (V)	$V_{CE(sat)}$ @ $T_j = 25^\circ\text{C}$ (V)		V_f (V) Typ.	f_{PWM} (kHz) Max.	t_{DEAD} (μs) Min.	SC* (A)	OT ($^\circ\text{C}$)	UV (V)	IGBT $R_{th(j-c)}$ ($^\circ\text{C}/\text{W}$)	Diode $R_{th(j-c)}$ ($^\circ\text{C}/\text{W}$)	$R_{th(c-f)}$ ($^\circ\text{C}/\text{W}$)	
				Typ.	Max.										
HV-IPM															
PM1200HCE330-1	3300	1200	6000	3.05	3.97	2.9	2.0	8.0	2200	113	20	0.0083	0.0167	0.0075	PM1



Dimensions in mm

High Voltage Integrated Circuits



Half Bridge Driver HVIC

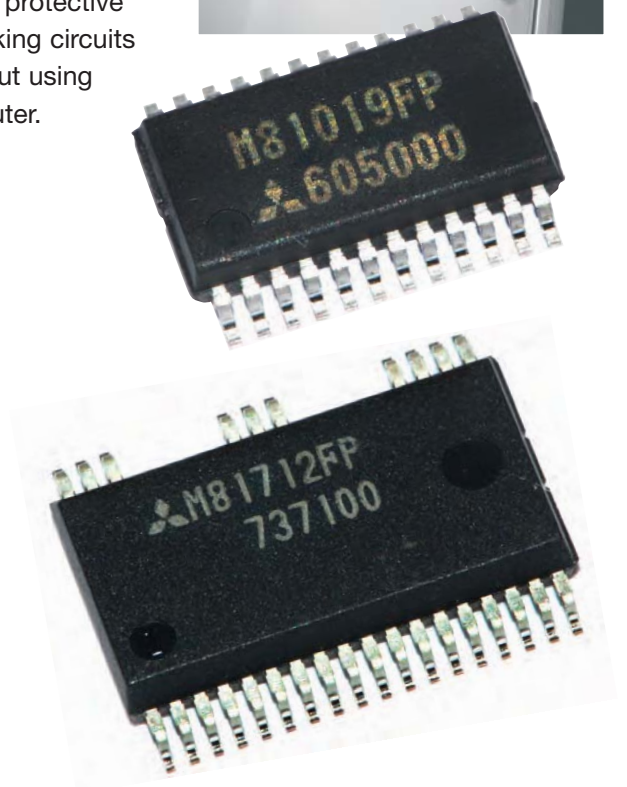
This product is a semiconductor integrated circuit designed to directly drive the power MOS/IGBT modules of half bridge composition by integrating the 1200V, 600V and 8/24V dielectric elements onto one chip.

The internal installation of high side/low side driver circuits, protective circuits against the power supply voltage drop and interlocking circuits enables a device to drive/control the power elements without using the photocoupler from a logic circuit such as a microcomputer.

Applications

Most suitable for the following applied products to drive the power MOS/IGBT modules for inverters:

- General inverters
- Air conditioners, refrigerators and washing machines
- AC servo motors
- DC brushless motors
- Plasma display panel
- Illumination machinery

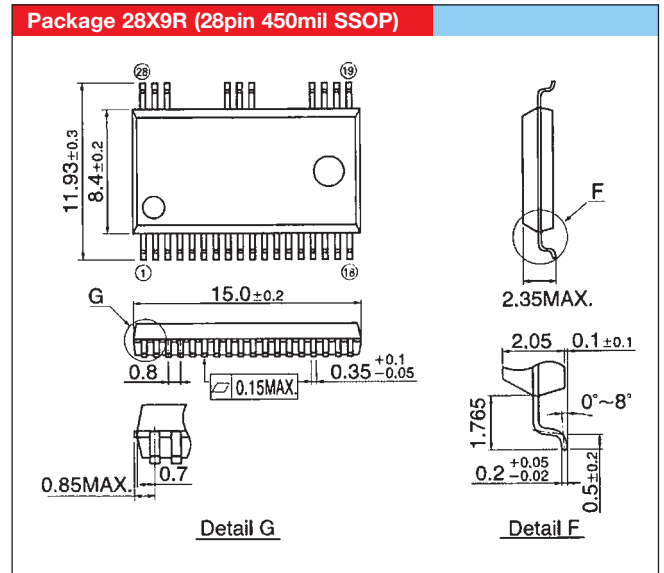
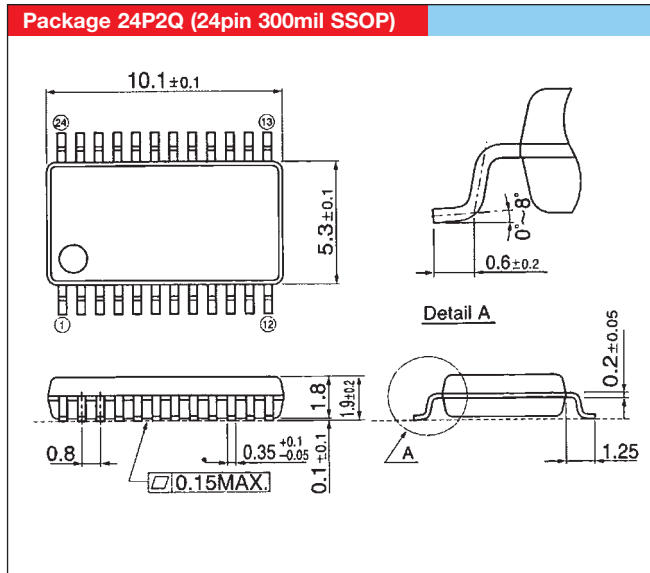
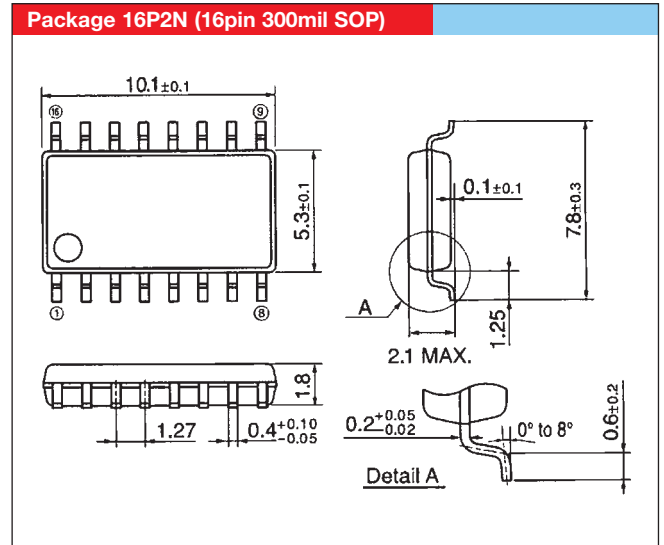
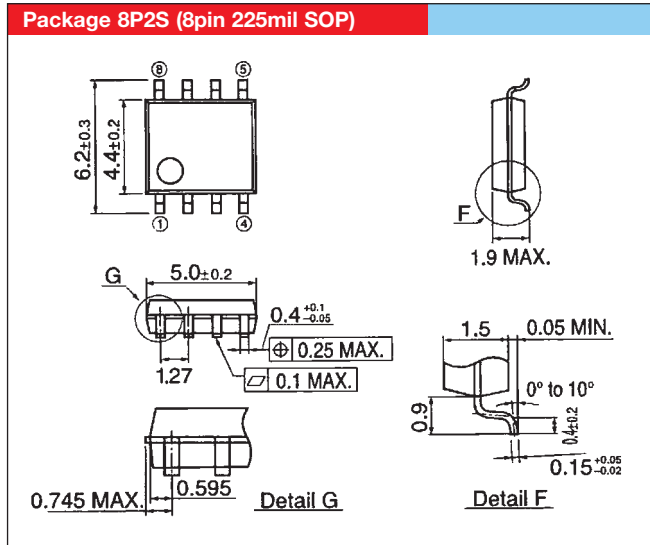


5. High Voltage Integrated Circuits

Driving method	Number of input-signals	Generation	Typename	Floating supply voltage (V)	Output current (A)	Dead-time control	Functions	Package outline
3 Phase	2x3Ø	3rd	M81712FP	600	0.2/-0.5	Input Signal	UV, IL, NF	28X9R
Half Bridge	2	3rd	M81706AFP	600	0.2/-0.35	Input Signal	UV, IL	8P2S
			M81708FP	600	0.2/-0.35	Input Signal	UV, IL	16P2N
			M81719FP	600	0.2/-0.35	Input Signal	UV, NF	8P2S
			M81720FP	600	0.2/-0.35	Input Signal	UV, IL, NF	8P2S
			M81721FP	600	1.0	Input Signal	UV, NF, SC, FO, FORST, FOIN	24P2Q
			M81019FP	1200	1.0	Input Signal	UV, NF, SC, FO, FORST, FOIN	24P2Q
			M81700FP	600	2.5	Input Signal	UV, IL, SD	16P2N
			M81701FP	600	2.5	Input Signal	UV, IL	16P2N
			M81702FP	600	2.5	Input Signal	UV, SD	16P2N
			M81703FP	600	2.5	Input Signal	UV	16P2N
			M81709FP	600	2.5	Input Signal	UV, IL	16P2N
			M81722FP	600	3.0	Input Signal	UV, NF	8P2S
	2	4th	M81736FP	600	0.2/-0.35	Input Signal	UV, IL compatible with M81706AFP	8P2S
			M81735FP	600	0.5	Input Signal	UV, IL	16P2N
	1	3rd	M81713FP	600	0.5	Internal	UV	8P2S
		4th	M81734FP	600	0.5	Internal	UV compatible with M81713FP	8P2S
	Dual Half Bridge	1x2	3rd	M81707FP	600	0.1	Input Signal	UV
M81731FP				600	3.0	Input Signal	UV, NF	16P2N
4th			M81723FP	600	0.13/-0.1	Input Signal	UV compatible with M81707FP	16P2N
			M81737FP	600	0.2	Input Signal	UV	16P2N
Dual Low side	1x2	3rd	M81711FP	24	1.01/-0.8		Low active	8P2S
			M81716FP	24	1.01/-0.8		High active	8P2S
Single High side	1	2nd	M81705FP	600	0.15/-0.13		UV	8P2S
		3rd	M81725FP	600	3.0		UV, NF	8P2S

UV: Under Voltage / **IL:** Inter Lock / **NF:** Input Noise Filter / **SC:** Short Current / **SD:** Shut Down /
SS: Soft Shutdown / **FO:** Failure Output / **FOIN:** FO Input / **FORST:** FO reset / **CFO:** Capacitor FO

5. High Voltage Integrated Circuits



Notes

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