

Thyristors

Phase Control Thyristors :

* Peak off state voltage and reverse voltage

Average on-state current *	50V	100V	200V	300V	400V	600V	800V	1000V
0.1A	SF0R1A42				SF0R1G42			
0.3A		SF0R1B42	SF0R1D42		SF0R3G42	SF0R3J42		
0.5A		SF0R3B42	SF0R3D42		SF0R5G42	SF0R5J42		
1A		SF0R5B43	SF0R5D43		SF0R5G43	SF0R5J43		
2A		SF1B12	SF1D12		SF1G12			
		SF2B41	SF2D41		SF2G41	SF2J41		
3A		SF3B14	SF3D14		SF3G14			
		SF3B41	SF3D41		SF3G41	SF3J41		
		SF3B42	SF3D42		SF3G42	SF3J42		
			SF3D42C		SF3G42C			
5A		SF5B13	SF5D13	SF5F13	SF5G13	SF5J13		
		SF5B14	SF5D14		SF5G14			
		SF5B41	SF5D41		SF5G41	SF5J41		
		SF5B42	SF5D42		SF5G42	SF5J42		
8A			SF5D41A		SF5G41A	SF5J41A		
		SF8B41	SF8D41		SF8G41	SF8J41		
			SF8D41A		SF8G41A	SF8J41A		
10A		SF10B13	SF10D13	SF10F13	SF10G13	SF10J13	SF10I13	SF10N13
		SF10B14	SF10D14		SF10G14			
		SF10B41	SF10D41		SF10G41	SF10J41		
		SF10B41A	SF10D41A		SF10G41A	SF10J41A		
16A		SF16B13	SF16D13	SF16F13	SF16G13	SF16J13	SF16I13	SF16N13
		SF16B14	SF16D14		SF16G14			
25A			SF25D13	SF25F13	SF25G13	SF25J13	SF25I13	SF25N13
30A			SF30D13	SF30F13	SF30G13	SF30J13	SF30I13	SF30N13
50A			SF50D13	SF50F13	SF50G13	SF50J13	SF50I13	SF50N13
80A							SF80I13	SF80N13
100A			SF80D15		SF80G15	SF80J15	SF100I.25	SF100N27
150A		SF150B27	SF150D27		SF150G27	SF150J27	SF150I.13	SF150N13
					SF150G15	SF150J15		
250A							SF250I.27	SF250N27
300A		SF300B27	SF300D27		SF300G27	SF300J27	SF300I.13	SF300N13
					SF300G15	SF300J15		
350A								
400A							SF400I.27	SF400N27
500A		SF500B27	SF500D27		SF500G27	SF500J27	SF500I.27	SF500N27
600A		SF600B27	SF600D27		SF600G27			
800A						SF600J27		
1000A						SF800J25	SF800I.25	SF800N25
						SF800J26	SF800I.26	SF800N26
1500A								
2500A					SF1500G27	SF1500J27	SF1500I.27	
3000A								

Suffix A means the high gate sensitivity type.
Suffix C means the non reverse blocking type.

High Speed Thyristors

* Peak off state voltage and reverse voltage

Average on-state current *	Turn off time	100V	200V	300V	400V	500V	600V	800V
0.3A	6 μs	SH0R3H42	SH0R3D42					
2A	15 μs	SH2B41	SH2D41		SH2G41			
5A	10 μs	SH5B13	SH5D13	SH5F13	SH5G13	SH5H13	SH5J13	
16A	10 μs	SH16B13	SH16D13	SH16F13	SH16G13	SH16H13	SH16J13	
30A	15 μs		SH30D13A	SH30F13A	SH30G13A	SH30H13A	SH30J13A	SH30I.13A
50A	15 μs		SH50D13A	SH50F13A	SH50G13A	SH50H13A	SH50J13A	SH50I.13A
80A	15 μs		SH80D13A	SH80F13A	SH80G13A		SH80J13A	SH80I.13A
100A	15 μs		SH100D21A	SH100F21A	SH100G21A		SH100J21A	SH100I.21A
	80 μs							
150A	15 μs		SH150D13A	SH150F13A	SH150G13A		SH150J13A	SH150I.13A
200A	15 μs		SH200D21A	SH200F21A	SH200G21A		SH200J21A	SH200I.21A
	80 μs							
300A	10 μs						SH300J23A1	
	15 μs		SH300D13A	SH300F13A	SH300G13A		SH300J13A	SH300I.13A
	15 μs		SH400D21A	SH400F21A	SH400G21A		SH400J21A	SH400I.21A
	25 μs							SH400I.25B
400A	25 μs							
	80 μs							
	40 μs							

1200V	1300V	1600V	2000V	2500V	3500V	4000V	
							0.1A
							0.3A
							0.5A
							1A
							2A
							3A
							5A
							8A
							10A
SF16Q13							16A
SF25Q13							25A
SF30Q13							30A
SF50Q13							50A
SF80Q13	SF80R13	SF80U13					80A
SF100Q27	SF100R27	SF100U27					100A
SF150Q13	SF150R13	SF150U13					150A
SF250Q27	SF250R27	SF250U27					250A
SF300Q13	SF300R13	SF300U13				SF300HX22	300A
							350A
SF400Q27	SF400R27	SF400U27					400A
SF500Q27	SF500R27	SF500U25 SF500U26 SF500U27	SF500Y25 SF500Y26	SF500EX25 SF500EX26			500A
							600A
	SF800R25 SF800R26	SF800U25 SF800U26			SF800GX21		800A
				SF1000EX24	SF1000GX21		1000A
SF1500Q27		SF1500U27		SF1500EX24 SF2500EX21	SF1500GX21		1500A
							2500A
					SF3000GX21		3000A

1000V	1200V	1300V	1600V	2500V	
					0.3A
					2A
					5A
					16A
					30A
					50A
					80A
SH100N21D	SH100Q21D	SH100R21D	SH100U21D		100A
					150A
SH200N21D	SH200Q21D	SH200R21D	SH200U21D		200A
					300A
SH400N25B		SH400R25B SH400R26B			400A
SH400N21D	SH400Q21D	SH400R21D	SH400U21D	SH400EX26C	

Gate Turn-Off Thyristors (GTO) (Asymmetrical type)

* Peak off state voltage

Peak turn off current	1300V	1600V	1800V	2500V	3300V	4500V	6000V
300A	SG300R11 SG300R12	SG300U11 SG300U12	SG300W11 SG300W12	SG300EX11 SG300EX12			
400A	SG400R11 SG400R22	SG400U11 SG400U22	SG400W11 SG400W22	SG400EX11 SG400EX22			
500A					SG500FXF22	SG500GXH22	SG500JX22
700A	SG700R11 SG700R22	SG700U11 SG700U22	SG700W11 SG700W22	SG700EX11 SG700EX22	SG700FXF11		
800A	SG800R11 SG800R12	SG800U11 SG800U12	SG800W11 SG800W12	SG800EX11 SG800EX12	SG800FXF22	SG800GXH22	
1000A	SG1000R23	SG1000U23	SG1000W23	SG1000EX23			
1200A	SG1200R23	SG1200U23	SG1200W23	SG1200EX23			
1500A	SG1500R22	SG1500U22	SG1500W22		SG1500FXF22	SG1500GXH22	
2000A	SG2000R22	SG2000U22	SG2000W22	SG2000EX22			
2500A					SG2500FXF22	SG2500GXH22	
2700A	SG2700R22	SG2700U22	SG2700W22	SG2700EX22			

Gate Turn-Off Thyristors (GTO) (Reverse blocking type)

* Peak off state voltage

Peak turn-off current	1300V	2500V
600A	SG600R21	SG600EX21
800A	SG800R21	SG800EX21
1000A	SG1000R22	
1200A		SG1200EX21
1400A		SG1400EX21
2000A		SG2000EX21

Light Triggered Thyristors

* Peak off state voltage and reverse voltage

Average on-state current	4000V
1500A	SL1500GX21
3000A	SL3000GX22

Reverse Conducting Thyristors

* Peak off state voltage

Average on-state current	600V	1300V	2500V
300A	SH300J26		
400A		SHR400R21	SHR400EX24

Gate Turn-Off Thyristors (GTO) (Symmetrical type)

* Peak off state voltage

Peak turn-off current	2500V	3300V	4500V
500A		SG500FXF21	SG500GXH21
800A		SG800FXF21	SG800GXH21
1500A		SG1500FXF21	SG1500GXH21
2000A	SG2000EX21 (VRRM)	SG2000FXF21	SG2000GXH21
2500A		SG2500FXF21	SG2500GXH21

Bi-Directional Triode Thyristors (TRIACs)

• Peak off-state voltage

R.M.S. on-state current	Non-isolation Type	Package	100V	200V	400V	600V
			SM0R5B42	SM0R5D42	SM0R5G42	
0.5A	1A	TO-92		SM1D43	SM1G43	
		TO-202	SM2B41	SM2D41	SM2G41	
	2A	DIP		SM2D44	SM2G44	
		DIP		USM2D44	USM2G44	
	3A	TO-202	SM3B41	SM3D41	SM3G41	SM3J41
		DIP			SM3G44	SM3J44
		TO-220AB			SM3G45	SM3J45
		DIP			USM3G44	USM3J44
	6A	TO-66	SM6B14	SM6D14	SM6G14	SM6J44
		DIP			SM6G44	SM6J44
		TO-220AB		SM6D45	SM6G45	SM6J45
	8A	TO-220AB		SM6D45A	SM6G45A	SM6J45A
DIP				USM6G44	USM6J44	
TO-220AB			SM8D41	SM8G41	SM8J41	
TO-220AB			SM8D45	SM8G45	SM8J45	
10A	TO-220AB		SM8D45A	SM8G45A	SM8J45A	
	TO-66		SM10D10	SM10G10		
	TO-3		SM10D14	SM10G14		
12A	TO-220AB		SM12D41	SM12G41	SM12J41	
	TO-220AB		SM12D45	SM12G45	SM12J45	
	TO-220AB		SM12D45A	SM12G45A	SM12J45A	
16A	TO-3		SM16D14	SM16G14		
	TO-66		SM16D16	SM16G16		
	TO-220AB			SM16G45	SM16J45	
	TO-220AB			SM16G45A	SM16J45A	
3A	TO-220 (IS)			SM3GZ46	SM3JZ46	
	NEW TO-220 (IS)			SM3GZ47	SM3JZ47	
	TO-220 (IS)		SM6DZ46	SM6GZ46	SM6JZ46	
6A	TO-220 (IS)		SM6DZ46A	SM6GZ46A	SM6JZ46A	
	NEW TO-220 (IS)			SM6GZ47	SM6JZ47	
	NEW TO-220 (IS)			SM6GZ47A	SM6JZ47A	
8A	TO-220 (IS)		SM8DZ46	SM8GZ46	SM8JZ46	
	TO-220 (IS)		SM8DZ46A	SM8GZ46A	SM8JZ46A	
	NEW TO-220 (IS)			SM8GZ47	SM8JZ47	
	NEW TO-220 (IS)			SM8GZ47A	SM8JZ47A	
12A	TO-220 (IS)		SM12DZ46	SM12GZ46	SM12JZ46	
	TO-220 (IS)		SM12DZ46A	SM12GZ46A	SM12JZ46A	
	NEW TO-220 (IS)			SM12GZ47	SM12JZ47	
16A	NEW TO-220 (IS)			SM12GZ47A	SM12JZ47A	
	TO-3 Flat		SM16DZ41	SM16GZ41	SM16JZ41	
	NEW TO-220 (IS)			SM16GZ47	SM16JZ47	
25A	NEW TO-220 (IS)			SM16GZ47A	SM16JZ47A	
	TO-3 Flat		SM25DZ41	SM25GZ41	SM25JZ41	

Top suffix "U": Surface mount Device.
Last suffix "A": High gate sensitivity type.

Thyristors for Special Applications

• Peak off-state & reverse voltage

Application & Rating	Package	300V	400V	600V
TV	3 A	TO-220 IS	S6565F	S6565G
	3 A	TO-220AB	S6612F	S6612G
Strobo	Trigger	TO-92		S6370
	Quence	TO-202		S6111
		TO 202 Fin Cut		
	Chopper	TO-220AB Tab Cut		
TO-220AB				SH8G41
Radar	5 A	M5 Stud		SH5J12U
	16A	M6 Stud		SH16J12U

Resistor (Thyristor with Resistor)

	R _{GK} = 1KΩ	R _{GK} = 2.7KΩ	R _{GK} = 5.1KΩ
0.5A	RSF05G1-1P	RSF05G1-3P	RSF05G1-5P

PUT

Package	Type No.
TO-92	TN41A, TN41B

Thyristor Stacks

● AC power control stacks

	Circuit	Line voltage		Line current (Ta=50°C)		Thyristor
		220V	440V	Free convection	Forced (5m/s) convection	
Single phases		SF16J2H1	SF1602H2	19A	32A	Stud package type
		SF30J2H1	SF30Q2H2	44A	54A	"
		SF50J2H1	SF50Q2H2	57A	100A	"
		SF80J2H1	SF80Q2H2	93A / 80A	173A / 160A	"
		SF150J2H1	SF150Q2H2	155A / 133A	310A / 321A	"
		SF300J2H1	SF300Q2H2	244A / 188A	521A / 444A	"
Three phases		SF16J6S1	SF16Q6S2	18A	32A	Stud package type
		SF30J6S1	SF30Q6S2	39A	54A	"
		SF50J6S1	SF50Q6S2	55A	100A	"
		SF80J6S1	SF80Q6S2	88A / 78A	148A	"
		SF150J6S1	SF150Q6S2	140A / 129A	288A / 299A	"
		SF300J6S1	SF300Q6S2	200A / 177A	444A / 400A	"

● Bridge stacks

	Circuit	Line voltage		Output current		Thyristor and rectifier
		220V	440V	Free convection Ta=50°C	Forced air cooling (5m/s)	
Single phase bridge		SF16L4B1		17A	29A	Stud package type
		SF30L4B1		36A	49A	"
		SF50L4B1		50A	90A	"
		SF80L4B1	SF80U4B2	70A	134A	"
		SF150L4B1	SF150U4B2	116A	270A	"
		SF300L4B1	SF300U4B2	160A	360A	"
3-phase bridge		SF16L6A1		25A	43A	Stud package type
		SF30L6A1		54A	73A	"
		SF50L6A1		75A	135A	"
		SF80L6A1	SF80U6A2	105A	201A	"
		SF150L6A1	SF150U6A2	174A	405A	"
		SF300L6A1	SF300U6A2	240A	540A	"

Thyristor Control Units

● 3-phase bridge control unit

Line voltage		Io Ta=50°C(A)	I surge (A)		Thyristor
220V	440V		1 cycle	10 cycle	
CU16L6A3		39	200	110	Stud package type
CU30L6A3		81	600	330	"
CU50L6A3		126	1000	600	"
CU80L6A3	CU80U6A3	171	1600	1250	"
CU150L6A3	CU150U6A3	300	3500	2000	"
CU300L6A3	CU300U6A3	405	6000	3500	"

Stud package type Control units are built-in Fuse

● 3-phase AC power control units

Line voltage		Line current Ta=50°C(Arms)	I surge (A)		Thyristor
220V	440V		1 cycle	10 cycle	
CU16J6S3	CU16Q6S3	28	200	110	Stud package type
CU30J6S3	CU30Q6S3	59	600	330	"
CU50J6S3	CU50Q6S3	94	1000	600	"
CU80J6S3	CU80Q6S3	133 / 126	1100 / 1600	800 / 1250	"
CU150J6S3	CU150Q6S3	222	3000 / 3500	1900 / 2000	"
CU300J6S3	CU300Q6S3	355 / 300	5500 / 6000	3000 / 3500	"

Stud package type Control units are built-in fuse

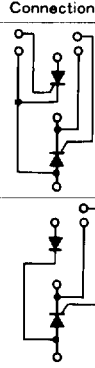
● TAC Series AC Power Controller

Phase control	AC Input Voltage	Output current (Ta=40°C)
TAC-30G1	100 ± 10% (φ _o)	30A
TAC-30J1	210 ± 10% (φ _o)	
TAC-65G1	100 ± 10% (φ _o)	65A
TAC-65J1	210 ± 10% (φ _o)	
TAC-100G1F	100 ± 10% (φ _o)	100A
TAC-100J1F	210 ± 10% (φ _o)	

Thyristor Modules

• Peak off-state voltage and reverse voltage

		400V	800V	1200V	1600V	Connection
Average on-state (forward) current ↓	Thyristor	30A	MSG60G41	MSG60L41	MSG60Q41	
			MSG60G43	MSG60L43	MSG60Q43	MSG60U43
		50A	MSG100G41	MSG100L41	MSG100Q41	MSG100U41
			MSG100G43	MSG100L43	MSG100Q43	MSG100U43
		90A	MSG180G41	MSG180L41	MSG180Q41	MSG180U41
			MSG180G43	MSG180L43	MSG180Q43	MSG180U43
Doublers	30A	MSA60G41	MSA60L41	MSA60Q41	MSA60U41	
		MSA60G43	MSA60L43	MSA60Q43	MSA60U43	
	50A	MSA100G41	MSA100L41	MSA100Q41	MSA100U41	
		MSA100G43	MSA100L43	MSA100Q43	MSA100U43	
	90A	MSA180G41	MSA180L41	MSA180Q41	MSA180U41	
		MSA180G43	MSA180L43	MSA180Q43	MSA180U43	



Solid State Relay

Zero-Cross Type

• Repetitive peak off-state voltage

		400 V	600 V
R.M.S on-state current ↓	1 A	TSS1G41	TSS1J41
		TSS1G42	TSS1J42
		TSS1G44	TSS1J44
		TSS1G44S	TSS1J44S
		TSS1G45	TSS1J45
		TSS1G45S	TSS1J45S
	2 A	TSS1G47	TSS1J47
		TSS1G47S	TSS1J47S
		TSS2G41	TSS2J41
		TSS2G41S	TSS2J41S
3 A	TSS2G44S	TSS2J44S	
	TSS2G45	TSS2J45	
	TSS2G45S	TSS2J45S	
	TSS2G47	TSS2J47	
5 A	TSS2G47S	TSS2J47S	
	TSS3G44S	TSS3J44S	
8 A	TSS3G45S	TSS3J45S	
	TSS3G47S	TSS3J47S	
10 A	TSS5G45S	TSS5J45S	
12 A	TSS8G47S	TSS8J47S	
16 A	TSS10G45S	TSS10J45S	
	TSS12G47S	TSS12J47S	
	TSS16G11S	TSS16J11S	
25 A	TSS16G41S	TSS16J41S	
	TSS16G47S	TSS16J47S	
	TSS25G41S	TSS25J41S	
	TSS25G47S	TSS25J47S	

Non Zero-Cross Type

• Repetitive peak off-state voltage

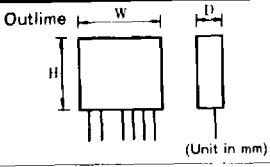
		400 V	600 V
R.M.S on-state current ↓	1 A	TSZ1G43S	TSZ1J43S
		TSZ1G44S	TSZ1J44S
	TSZ1G45S	TSZ1J45S	
	TSZ1G47S	TSZ1J47S	
	2 A	TSZ2G43S	TSZ2J43S
TSZ2G44S		TSZ2J44S	
TSZ2G45S		TSZ2J45S	
3 A	TSZ2G47S	TSZ2J47S	
	TSZ3G44S	TSZ3J44S	
	TSZ3G45S	TSZ3J45S	
8 A	TSZ3G47S	TSZ3J47S	
12 A	TSZ8G47S	TSZ8J47S	
16 A	TSZ12G47S	TSZ12J47S	
25 A	TSZ16G47S	TSZ16J47S	
	TSZ25G47S	TSZ25J47S	

Built-In 2 Circuits Type

• Repetitive peak off-stage voltage

		400 V	600 V
R.M.S on-state current ↓	1 A	TSS1G2A44S	TSS1J2A44S
	2 A	TSS2G2A44S	TSS2J2A44S
	1 A	TSZ1G2A44S	TSZ1J2A44S
	2 A	TSZ2G2A44S	TSZ2J2A44S

GTR Driver Modules

Type No.	BV _S /AC	V _{CC}	V _{EE}	V _{IN}	I _{OH}	I _{OLP}	t _{PLH}	t _{PHL}	
	(V)	(V)	(V)	(V)	(A)	(A)	(μ s)	(μ s)	
TF1202	2000	8.5	5	5.5	-2	6 (10 μ s)	7	7	D = 9 MAX. W = 47 MAX. H = 25 MAX.
TF1203	2000	6	-3	5.5	0.5	1.5 (10 μ s)	10	10	D = 9 MAX. W = 26 MAX. H = 20 MAX.
TF1204	2000	6	4	5.5	1	3 (10 μ s)	10	10	D = 9 MAX. W = 30 MAX. H = 25 MAX.