Standard metal film resistors SFR16S/25/25H

FEATURES

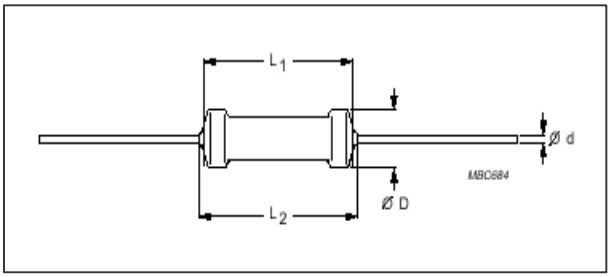
- Low cost
- Low noise
- Small size

APPLICATIONS

- General purpose resistors.

DESCRIPTION

A homogeneous film of metal alloy is Deposited on a high grade ceramic body. After a laser groove has been cut in the resistive layer, tined connecting leads of electrolytic copper are welded to the end-caps



TYPE	Dimensions (mm)			
	D ±0.8	L 1 ±0.8	L 2 Max.	d (±0.05)
SFR16S	1.7	3.2	3.4	0.45
SFR25	2.5	6.5	7.5	0.55
SFR25H	2.5	6.5	7.5	0.55

QUICK REFERENCE DATA

DESCRIPTION	VALUE		
	SFR16S	SFR25	SFR25H
resistance range	1 Ω to 5.6 MΩ	0.22 Ω to 10 MΩ and jumper (zero Ω)	
resistance tolerance	±5%, ±2%(E24 series), ±1%(E48, E96 series)		
temperature coefficient R ≤ 4.7 Ω R ≤ 1 MΩ R > 1 MΩ	 ±250 ppm / ℃ ±100 ppm / ℃ ±250 ppm / ℃	 ±250 ppm / ℃ ±100 ppm / ℃ ±250 ppm / ℃	 ±250 ppm / ℃ ±100 ppm / ℃ ±250 ppm / ℃
rated dissipation at T_{amb} = 70 ℃	0.125W	0.25W	0.5W
max. working voltage	200 V	250 V	350 V
max. overload voltage	400 V	500 V	700 V
noise : R ≤ 1 MΩ R > 1 MΩ	 max. 0.1 μV/V max. 1.5 μV/V	 max. 0.1 μV/V max. 1.5 μV/V	 max. 0.1 μV/V max. 1.5 μV/V
basic specifications	IEC 60 115-1 and 60 115-2		
climatic category (IEC60)	55 / 155 / 56		
stability, $\Delta R/R_{max}$ after load : 1000 hours R ≤ 1 MΩ R > 1 MΩ	 ± 1% +0.05 Ω ± 1% +0.05 Ω	 ± 1% +0.05 Ω ± 1% +0.05 Ω	 ± 1% +0.05 Ω ± 2% +0.1 Ω
climatic tests R ≤ 1 MΩ R > 1 MΩ	 ± 1% +0.05 Ω ± 1% +0.05 Ω	 ± 1% +0.05 Ω ± 1% +0.05 Ω	 ± 1% +0.05 Ω ± 2% +0.1 Ω
soldering	± 0.25% +0.05 Ω	± 0.25% +0.05 Ω	± 0.25% +0.05 Ω
short time overload	± 0.25% +0.05 Ω	± 0.25% +0.05 Ω	± 1% +0.05 Ω

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ORDERING INFORMATION

Ordering code indicating resistor types and packing

Table 1

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
SFR16S (0.125W)	52mm	ammo	5000	1Ω to 5.6 MΩ	5 2 1	PSFR 187 53xxx PSFR 187 54xxx PSFR 187 2xxxx

Note : 1% => 5.1Ω ~ 1 MΩ

Table 2

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
SFR25 (0.25W)	52mm	ammo	5000	0.22Ω to 10 MΩ	5 2 1	PSFR 181 43xxx PSFR 181 44xxx PSFR 188 2xxxx
			1000		5	PSFR 181 53xxx
		reel	5000	0.22Ω to 10 MΩ	5 2 1	PSFR 181 63xxx PSFR 181 64xxx PSFR 181 8xxxx
		ammo jumper	1000 5000	0 Ω	- -	PSFR 181 90018 PSFR 181 90019

Note : 1% => 5.1Ω ~ 1 MΩ

Table 3

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
SFR25H (0.5W)	52mm	ammo	5000	0.22Ω to 10 MΩ	5 2 1	PSFR 186 73xxx PSFR 186 74xxx PSFR 186 5xxxx
			1000		5	PSFR 186 13xxx
		reel	5000	0.22Ω to 10 MΩ	5	PSFR 186 23xxx

Note : 1% => : 5.1Ω ~ 1 MΩ

Table 4. Last digit of 12NC

Resistance decade	Last digit	Resistance decade	Last digit
1 to 9.76Ω	8	10 to 97.6 kΩ	3
10 to 97.6Ω	9	100 to 976 kΩ	4
100 to 976Ω	1	1 to 9.76 MΩ	5
1 to 9.76 kΩ	2	10 MΩ	6

Ordering Example

The ordering code of a SFR25H resistor, value 470 kΩ ±1%, taped on a bandolier of 5000 Units in ammopack is: PSFR 186 54704.

Table 5. Limiting values

TYPE	LIMITING VOLTAGE(1) (V)	LIMITING POWER (W)
SFR16S	200	0.125
SFR25	250	0.25
SFR25H	350	0.5

Note

1. the maximum voltage that may be continuously applied to the resistor element, see "IEC publication 60 115-1"

The maximum permissible hot – spot temperature is 155 ℃.

DERATING

The power that the resistor can dissipate depends on the operating temperature : Fig. 1

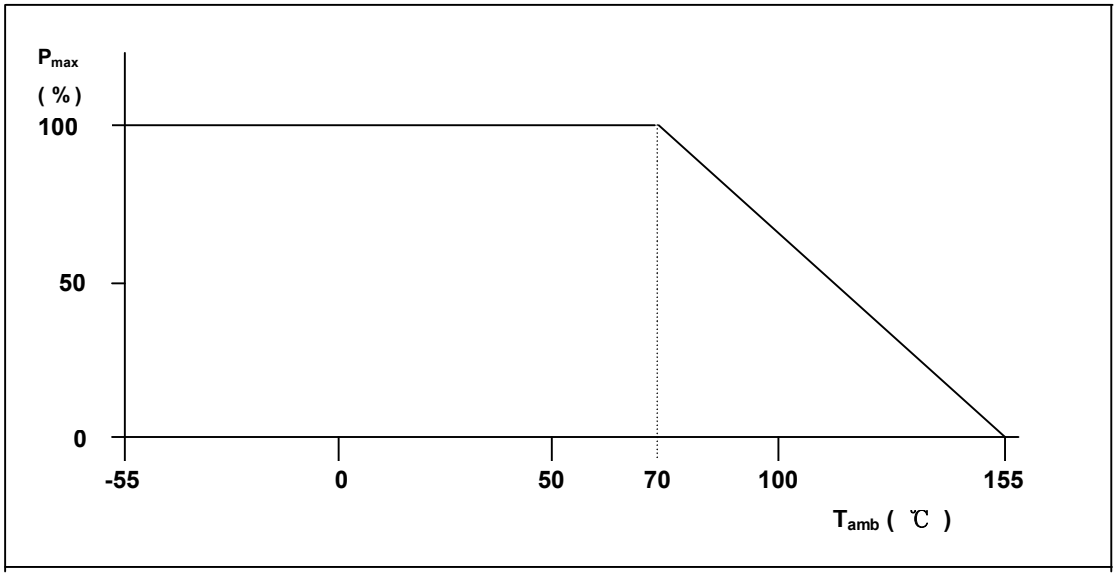

Fig. 1 Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient Temperature (T_{amb})

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PULSE LOADING CAPABILTIES

SFR16S

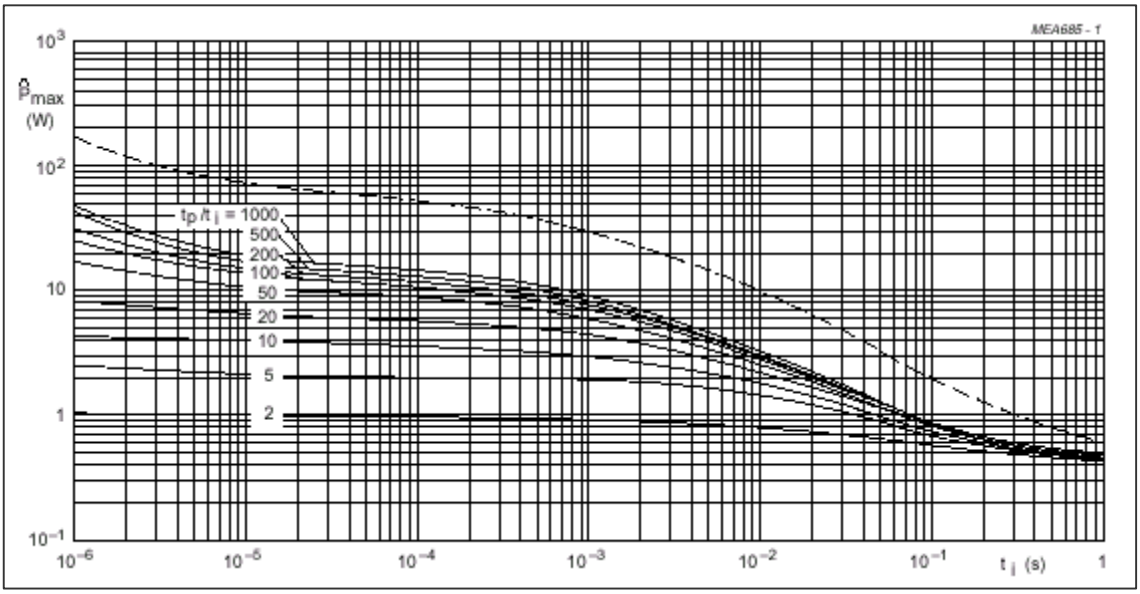

Fig. 2 Pulse on a regular basis: maximum permissible peak pulse power (P_{max}) as a function of pulse duration (t_i).

SFR25

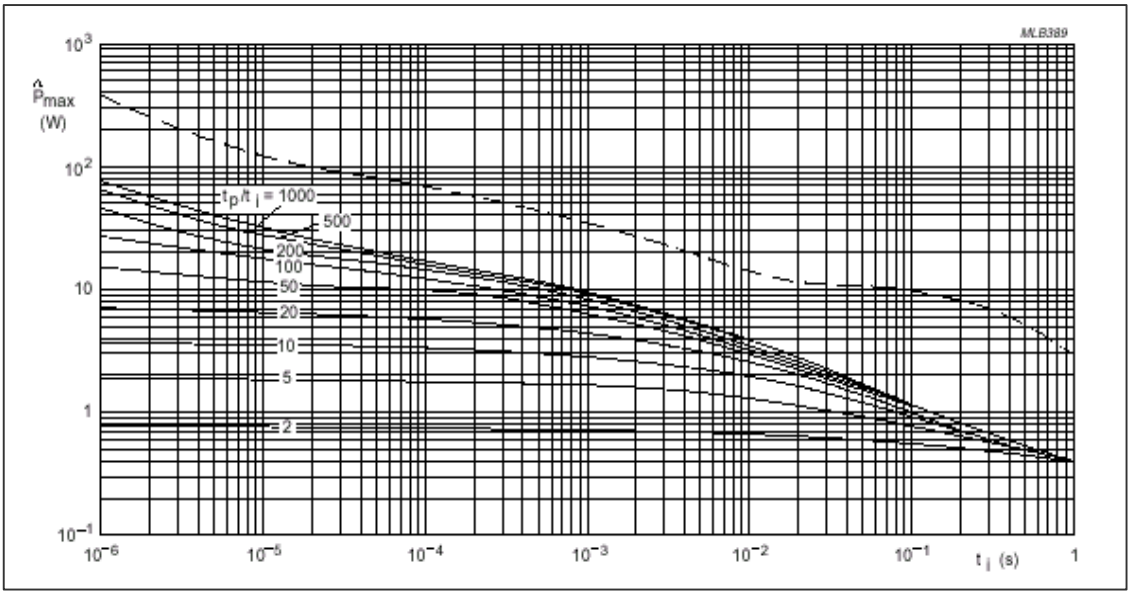

Fig. 3 Pulse on a regular basis: maximum permissible peak pulse power (P_{max}) as a function of pulse duration (t_i).

SFR25H

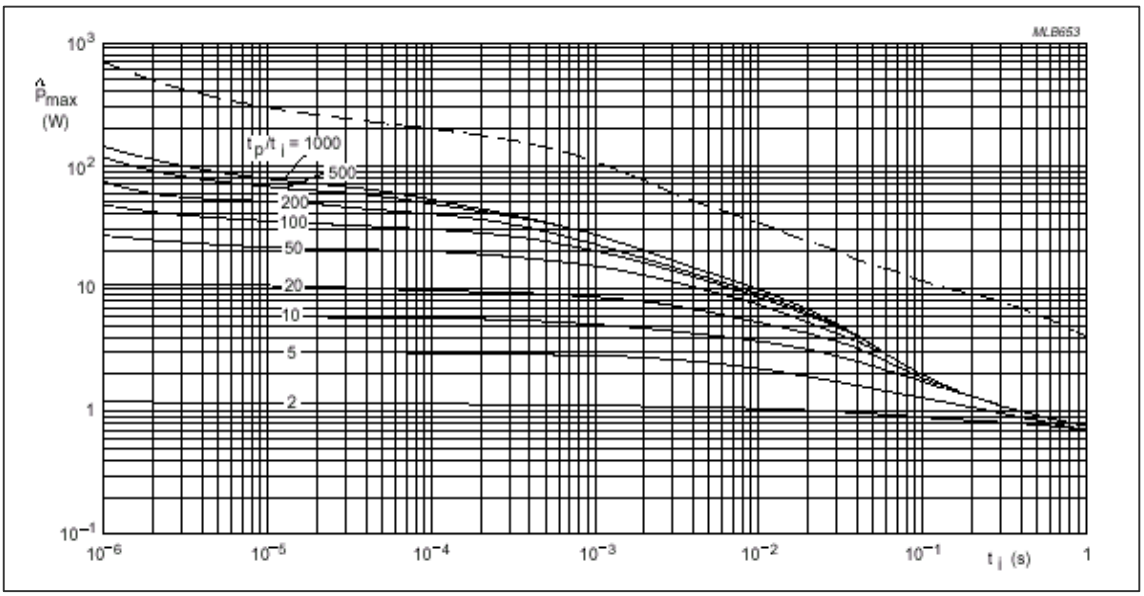

Fig. 4 Pulse on a regular basis: maximum permissible peak pulse power (P_{max}) as a function of pulse duration (t_i).

Application information

SFR16S

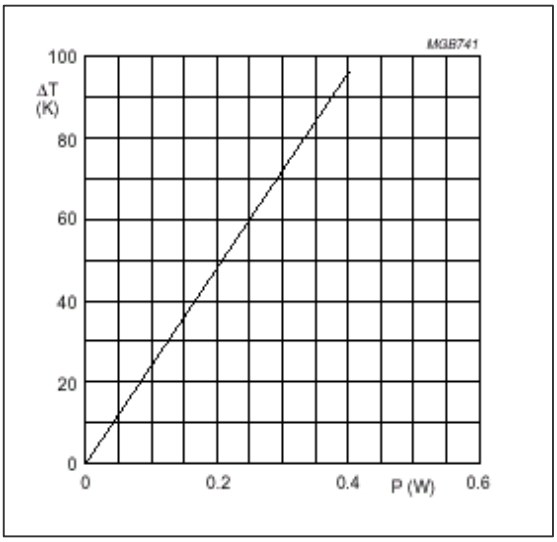

Fig. 5 Hot – spot temperature rise (Δ T) as a function of dissipated power

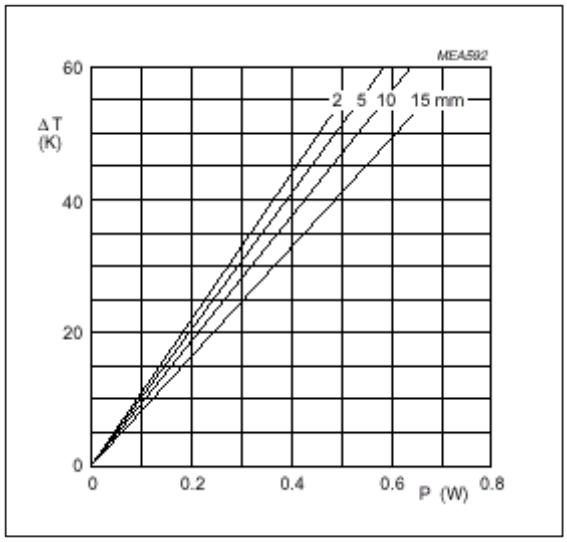

Fig.6 Temperature rise (Δ T) at the lead end of the lead (soldering point) as a function of dissipated Power at various lead lengths after mounting

SFR25

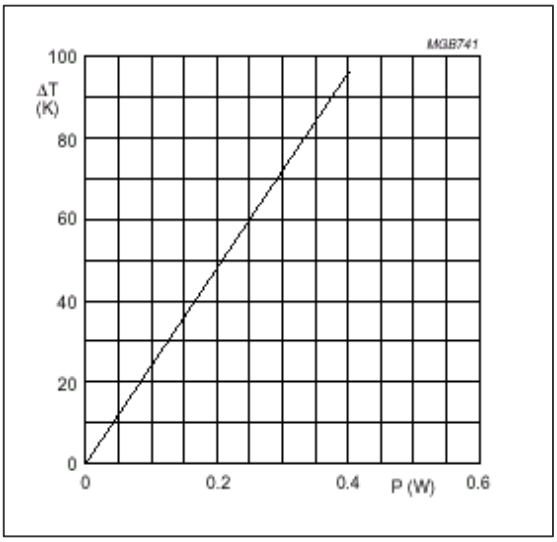

Fig. 7 Hot – spot temperature rise (Δ T) as a function of dissipated power

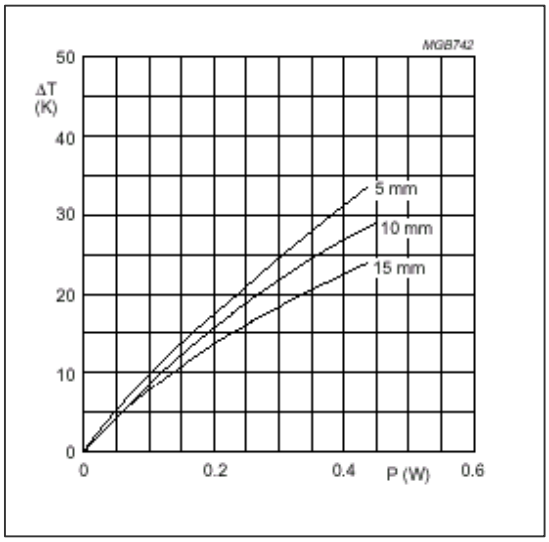

Fig.8 Temperature rise (Δ T) at the lead end of the lead soldering point as a function of dissipated power at various lead lengths after mounting

SFR25H

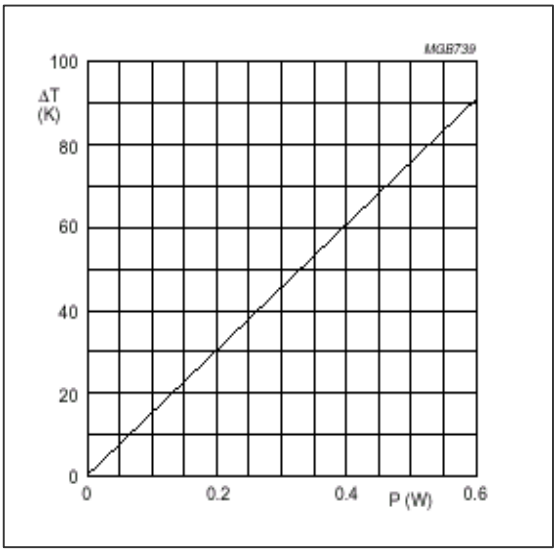

Fig. 9 Hot – spot temperature rise (Δ T) as a function of dissipated power

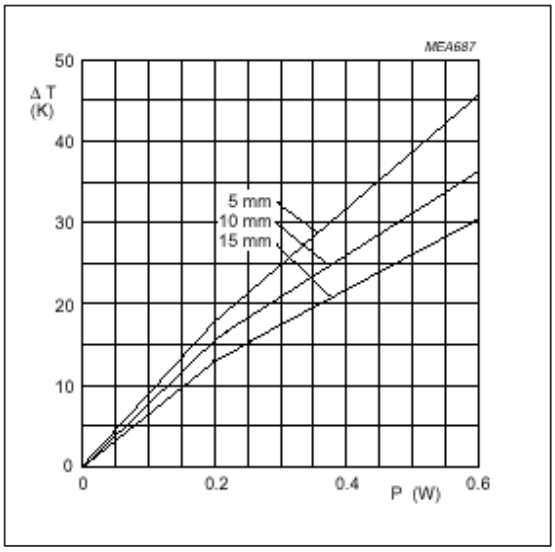

Fig.10 Temperature rise (Δ T) at the lead end of the lead soldering point as a function of dissipated power at various lead lengths after mounting

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MECHANICAL DATA

Table 6. Mass per 100 units

TYPE	MASS (g)
SFR16S	12.5
SFR25	25
SFR25H	25

MARKING

The nominal resistance and tolerance are marked on the resistor using four or five colored Bands in accordance with IEC publication 60 062 “color codes for fixed resistors”

Table 7. BODY COLORS

TYPE	COLORS
SFR16S	Light blue
SFR25	Light green
SFR25H	Red - brown

TEST AND REQUIREMENTS

Table 8. Test procedures and requirements

TEST	PROCEDURE	REQUIREMENTS		
		SFR16S	SFR25	SFR25H
robustness of terminations: tensile all samples	ϕ 0.45 mm: load 5N:10s ϕ 0.55 mm: load 10N:10s	number of failures < 10×10^{-6}		
bending half number of samples	ϕ 0.45 mm: load 2.5N: 4x90° ϕ 0.55 mm: load 5N: 4x90°	number of failures < 10×10^{-6}		
torsion other half number samples	3x360°in opposite directions	no damage ±0.25% + 0.05 Ω		
solderability	2 s ; 235℃ flux 600	good tinning; no damage		
soldering heat	Thermal shock: 3 s; 360℃ 6mm from body	± 0.25% +0.05Ω		
rapid change of temperature	30 minutes at –55℃ and 30 minutes at +155℃;5cycles	± 0.25% +0.05Ω		
vibration	frequency 10 to 500 Hz; displacement 1.5mm or acceleration 10g; 3 directions total 6 hours(3x2 hours)	no damage ± 0.25% +0.05Ω		
Climatic sequence dry heat damp heat (accelerated) 1st cycle cold low air pressure damp heat (accelerated) remaining cycles	16 hours;155℃ 24hours;55℃; 90 to 100% RH 2 hours; - 55℃ 2 hours;8.5 Kpa; 15 to 35℃ 5 days;55℃;95 to 100% RH	$R_{ins\ min}$; 1000 MΩ		
		R ≤ 1 MΩ : ± 1% + 0.05Ω		
		R > 1 MΩ: ± 1% + 0.05Ω	± 0.2% + 0.1Ω	
damp heat	56 days; 40 ℃; 90 to 95% RH dissipation 0.01 P_n	± 1% + 0.05Ω		R≤1 MΩ: ± 1% R>1 MΩ: ± 2%
endurance	1000 hours at 70 ℃; P_n or V_{max}	± 1% + 0.05Ω		R≤1 MΩ: ± 1% R>1 MΩ: ± 2%
temperature coefficient	between –55 ℃and +155 ℃	R ≤ 4.7Ω : ± 250 ppm/ ℃ R ≤ 100 kΩ : ± 100 ppm/ ℃ R ≤ 1 MΩ : ± 100 ppm/ ℃ R > 1 MΩ : ± 250 ppm/ ℃		
dielectric withstanding voltage	$400V_{RMS}$: SFR16S $500V_{RMS}$: SFR25 $500V_{RMS}$: SFR25H during 1min. V- block method	no breakdown		
noise	IEC publication 195	R ≤ 1 MΩ : 0.1 μV/V R > 1 MΩ : 1.5 μV/V		

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TEST AND REQUIREMENTS

TEST	PROCEDURE	REQUIREMENTS		
		SFR16S	SFR25	SFR25H
insulation resistance	500V_{DC} during 1 minute ; V – block method	min. : 1000 MΩ		
short time overload	rated voltage x 2.5 5 s on 45 s off (V≤2 x V_{max}) 10 cycles	±0.25% +0.05Ω		±1% +0.05Ω
intermittent overload	rated voltage x 4 1 s on 25 s off 10000 ±200 cycles V_{max}	± 0.75% + 0.05Ω		
pulse load		see Fig. 2.3.4.5.6. and 7		