

$V_R$	650V
$I_F$	4A
$Q_C$	11nC

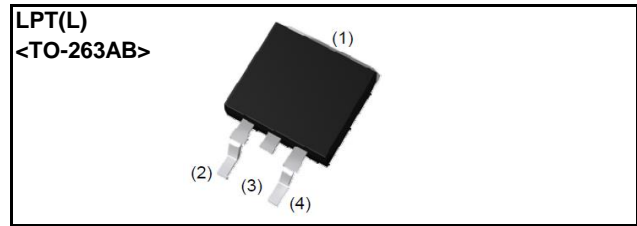
### ●Features

- 1) Low forward voltage
- 2) Negligible recovery time/current
- 3) Temperature independent switching behavior
- 4) High surge current capability
- 5) Low leakage current

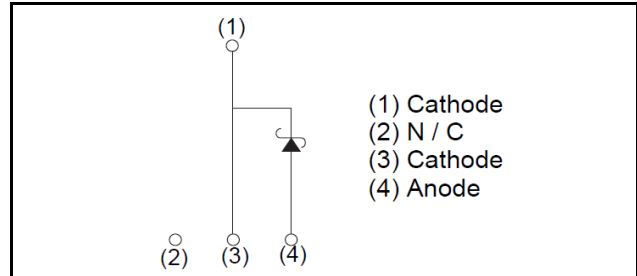
### ●Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply
- Solar Inverter
- Motor Drive
- Air Conditioner
- EV Charger

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packaging	Embossed tape
	Reel size (mm)	330
	Tape width (mm)	24
	Basic ordering unit (pcs)	1.000
	Packing code	TLL
	Marking	SCS304AJ

### ●Absolute maximum ratings ( $T_j = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit	
Reverse voltage (repetitive peak)	$V_{RM}$	650	V	
Reverse voltage (DC)	$V_R$	650	V	
Continuous forward current ( $T_c = 145^\circ\text{C}$ )	$I_F$	4	A	
Surge non-repetitive forward current	$I_{FSM}$	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	27	A
		PW=10ms sinusoidal, $T_j=150^\circ\text{C}$	22	A
		PW=10 $\mu\text{s}$ square, $T_j=25^\circ\text{C}$	100	A
Repetitive peak forward current	$I_{FRM}$	21 <sup>*1</sup>	A	
$i^2t$ value	$\int i^2 dt$	$1 \leq PW \leq 10\text{ms}$ , $T_j=25^\circ\text{C}$	3	A <sup>2</sup> s
		$1 \leq PW \leq 10\text{ms}$ , $T_j=150^\circ\text{C}$	2	A <sup>2</sup> s
Total power dissipation	$P_D$	37 <sup>*2</sup>	W	
Junction temperature	$T_j$	175	$^\circ\text{C}$	
Range of storage temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$	

\*1  $T_c=100^\circ\text{C}$ ,  $T_j=150^\circ\text{C}$ , Duty cycle=10% \*2  $T_c=25^\circ\text{C}$

**●Electrical characteristics ( $T_j = 25^\circ\text{C}$ )**

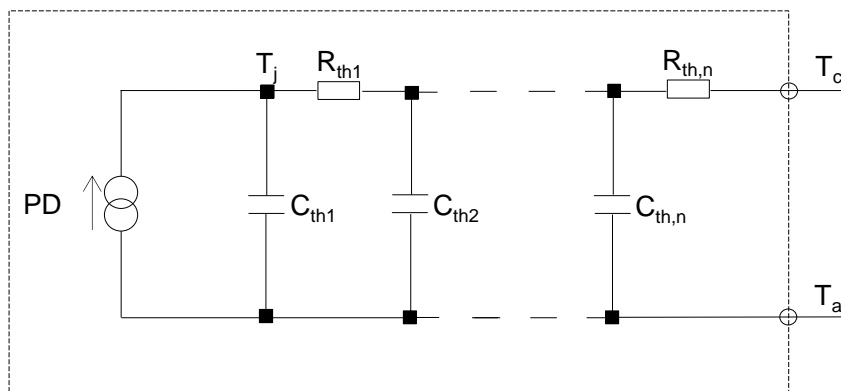
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R=20\mu\text{A}$	650	-	-	V
Forward voltage	$V_F$	$I_F=4\text{A}, T_j=25^\circ\text{C}$	-	1.35	1.50	V
		$I_F=4\text{A}, T_j=150^\circ\text{C}$	-	1.44	1.71	V
		$I_F=4\text{A}, T_j=175^\circ\text{C}$	-	1.50	-	V
Reverse current	$I_R$	$V_R=650\text{V}, T_j=25^\circ\text{C}$	-	0.012	20	$\mu\text{A}$
		$V_R=650\text{V}, T_j=150^\circ\text{C}$	-	0.8	80	$\mu\text{A}$
		$V_R=650\text{V}, T_j=175^\circ\text{C}$	-	2.4	-	$\mu\text{A}$
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	200	-	pF
		$V_R=650\text{V}, f=1\text{MHz}$	-	18	-	pF
Total capacitive charge	$Q_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	11	-	nC
Switching time	$t_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	14	-	ns
Non-repetitive Avaranche Energy	$E_{ava}$	$L=1\text{mH}$	-	48	-	mJ

**●Thermal characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	2.8	4.0	$^\circ\text{C}/\text{W}$

**●Typical Transient Thermal Characteristics**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	4.18E-01	K/W	$C_{th1}$	8.87E-05	Ws/K
$R_{th2}$	2.37E+00		$C_{th2}$	1.19E-03	
$R_{th3}$	1.02E-02		$C_{th3}$	2.99E-01	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

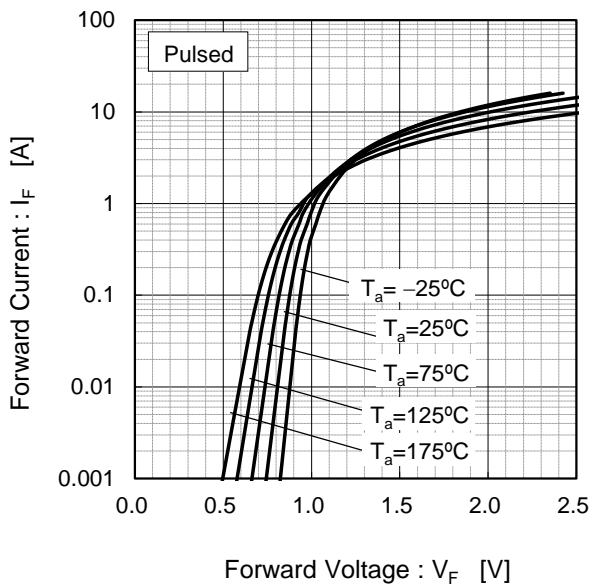


Fig.2  $V_F - I_F$  Characteristics

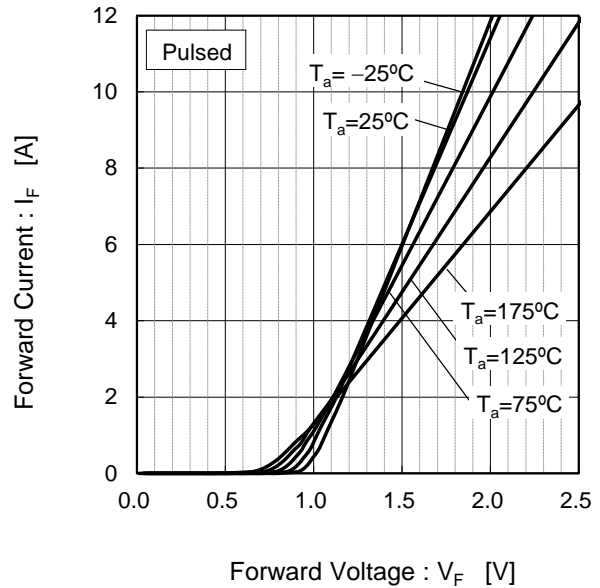


Fig.3  $V_R - I_R$  Characteristics

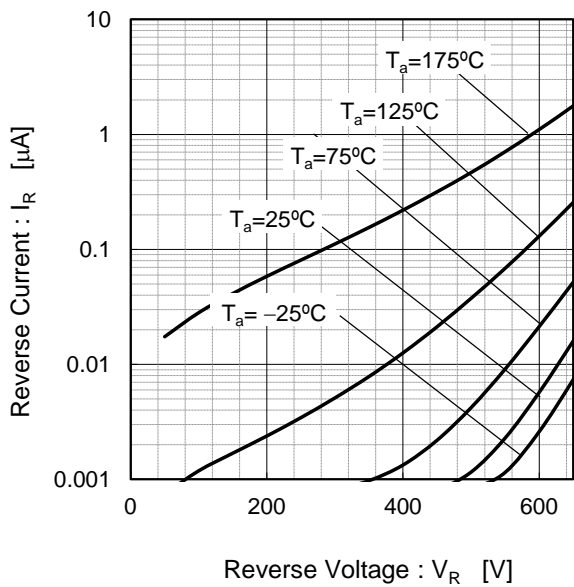
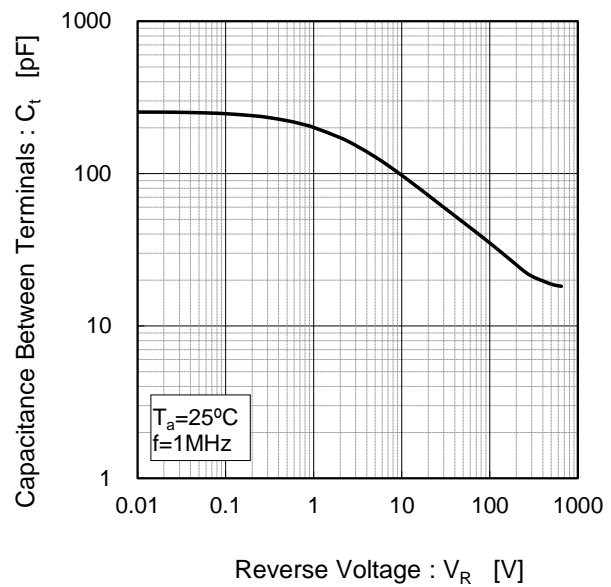


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

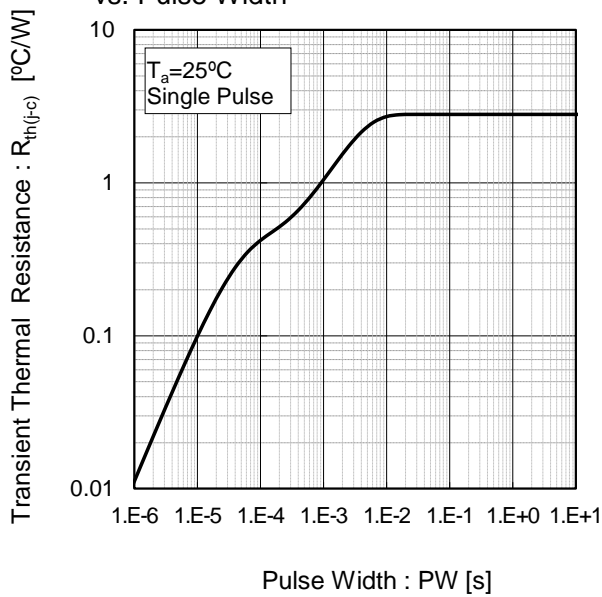


Fig.6 Power Dissipation

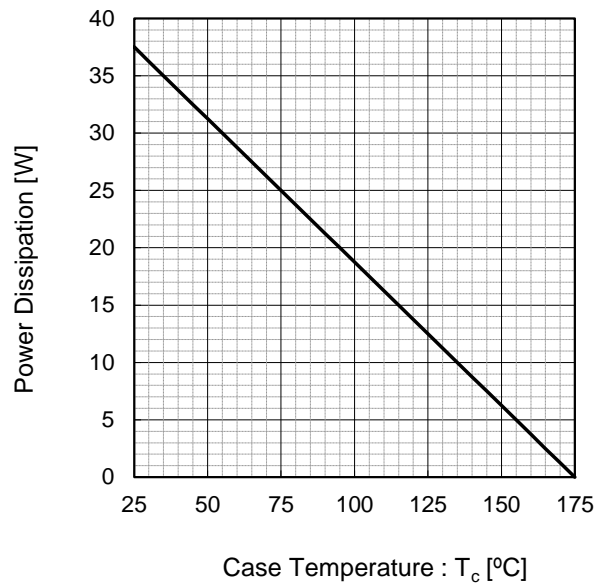
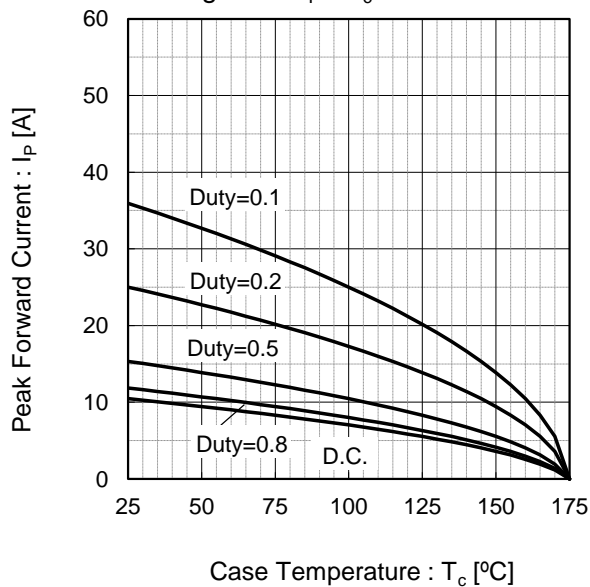
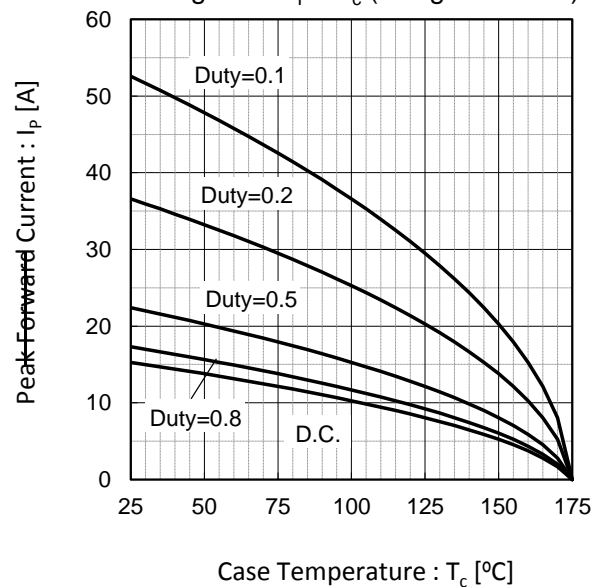


Fig.7\*3 Maximum peak forward current derating curve  $I_p - T_c$



\*3 Based on max Vf, max  $R_{th(j-c)}$   
Valid for switching of above 10kHz,  
excluding D.C. curve.

Fig.8\*4 Typical peak forward current derating curve  $I_p - T_c$  (Not guaranteed)



\*4 Based on typ Vf, typ  $R_{th(j-c)}$   
Typical value, not guaranteed  
Valid for switching of above 10kHz,  
excluding D.C. curve

●Electrical characteristic curves

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

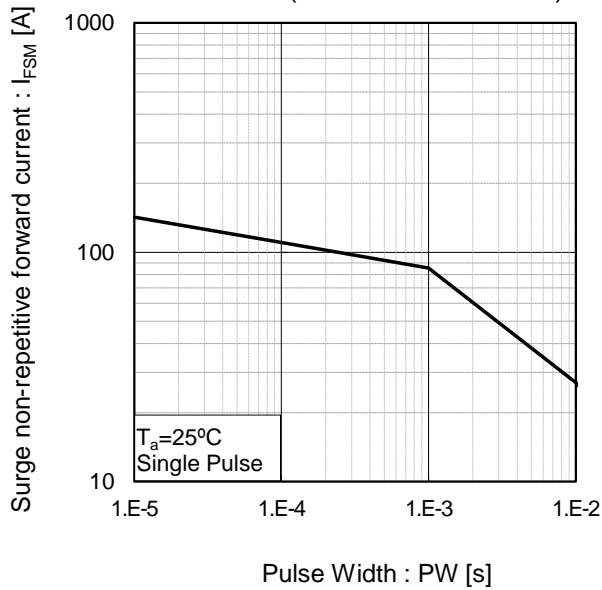
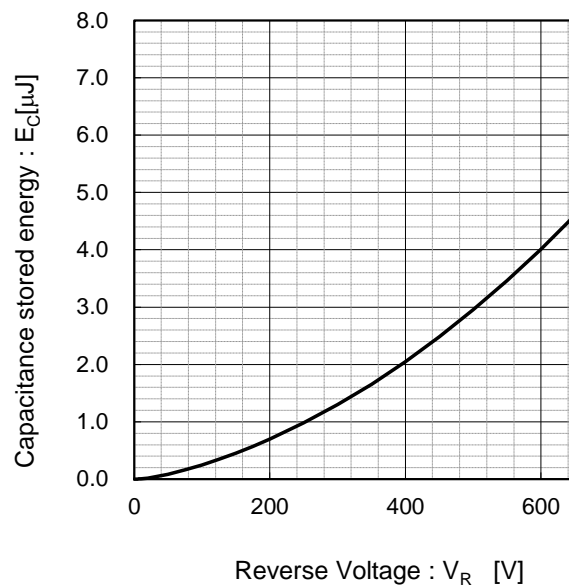
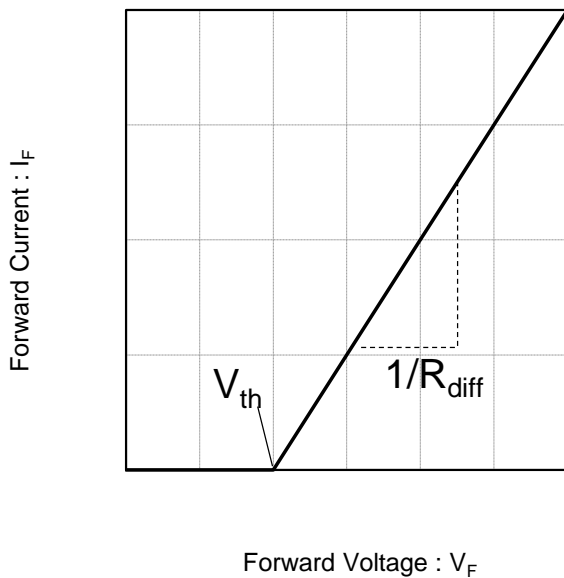


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_j) = a_0 + a_1 T_j$$

$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
$a_0$	9.66E-01	V
$a_1$	-1.10E-03	V/°C
$b_0$	8.80E-02	Ω
$b_1$	1.87E-04	Ω/°C
$b_2$	1.92E-06	Ω/°C <sup>2</sup>

$T_j$  in °C;  $-55\text{ °C} < T_j < 175\text{ °C}$ ;  $I_F < 8\text{ A}$

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