

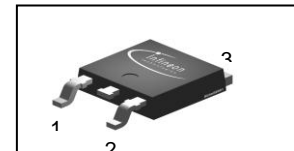
## 2<sup>nd</sup> Generation thinQ!<sup>TM</sup> SiC Schottky Diode

### Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- No temperature influence on the switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>1)</sup> for target applications
- Breakdown voltage tested at 20mA<sup>2)</sup>
- Optimized for high temperature operation

### Product Summary

$V_{DC}$	600	V
$Q_c$	8	nC
$I_F$	4	A

**PG-TO252**


### thinQ! 2G Diode specially designed for fast switching applications like:

- SMPS e.g.; CCM PFC; typ  $P_{out}$  = 400 - 800W
- Motor Drives; Solar applications; UPS

Type	Package	Marking	Pin 1	Pin 2	Pin 3
IDD04S60C	PG-TO252	D04S60C	n.c.	A	C

### Maximum ratings

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	$I_F$	$T_C < 130\text{ °C}$	4	A
		$T_C < 100\text{ °C}$	6	
RMS forward current	$I_{F,RMS}$	$f = 50\text{ Hz}$	5.6	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	32.6	
Repetitive peak forward current	$I_{F,RM}$	$T_j = 150\text{ °C}, T_C = 100\text{ °C}, D = 0.1$	19.6	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$	200	
$i^2t$ value	$\int i^2 dt$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	5.3	A <sup>2</sup> s
Repetitive peak reverse voltage	$V_{RRM}$		600	V
Diode dv/dt ruggedness	dv/dt	$V_R = 0 \dots 480\text{ V}$	50	V/ns
Power dissipation	$P_{tot}$	$T_C = 25\text{ °C}$	42	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 175	°C

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - case	$R_{thJC}$		-	-	3.6	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	SMD version, device on PCB, minimal footprint	-	-	75	
		SMD Version, device on PCB, 6 cm <sup>2</sup> cooling <sup>3)</sup>	-	-	50	
Soldering temperature reflowsoldering	$T_{sold}$	reflow MSL 3	-	-	260	°C

**Electrical characteristics, at  $T_j=25\text{ °C}$ , unless otherwise specified**
**Static characteristics**

DC blocking voltage	$V_{DC}$	$I_R=0.05\text{ mA}$	600	-	-	V
Diode forward voltage	$V_F$	$I_F=4\text{ A}, T_j=25\text{ °C}$	-	1.7	1.9	
		$I_F=4\text{ A}, T_j=150\text{ °C}$	-	2	2.4	
		$I_F=_\text{A}, T_j=25\text{ °C}$		1.9	2.1	
		$I_F=_\text{A}, T_j=150\text{ °C}$		2.3	2.9	
Reverse current	$I_R$	$V_R=600\text{ V}, T_j=25\text{ °C}$	-	0.5	50	μA
		$V_R=600\text{ V}, T_j=150\text{ °C}$	-	2	500	

**AC characteristics**

Total capacitive charge	$Q_c$	$V_R=400\text{ V}, I_F \leq I_{F,max}, di_F/dt=200\text{ A}/\mu\text{s}, T_j=150\text{ °C}$	-	8	-	nC
Switching time <sup>4)</sup>	$t_c$		-	-	<10	ns
Total capacitance	C	$V_R=1\text{ V}, f=1\text{ MHz}$	-	130	-	pF
		$V_R=300\text{ V}, f=1\text{ MHz}$	-	20	-	
		$V_R=600\text{ V}, f=1\text{ MHz}$	-	20	-	

<sup>1)</sup> J-STD20 and JESD22

<sup>2)</sup> All devices tested under avalanche conditions, for a time periode of 5ms at 20 mA.

<sup>3)</sup> Device on 40mm\*40mm\*1.5mm epox PCB FR4 with 6cm<sup>2</sup> (one layer, 70μm thick) copper area for drain connection. PCB is vertikal with out blown air.

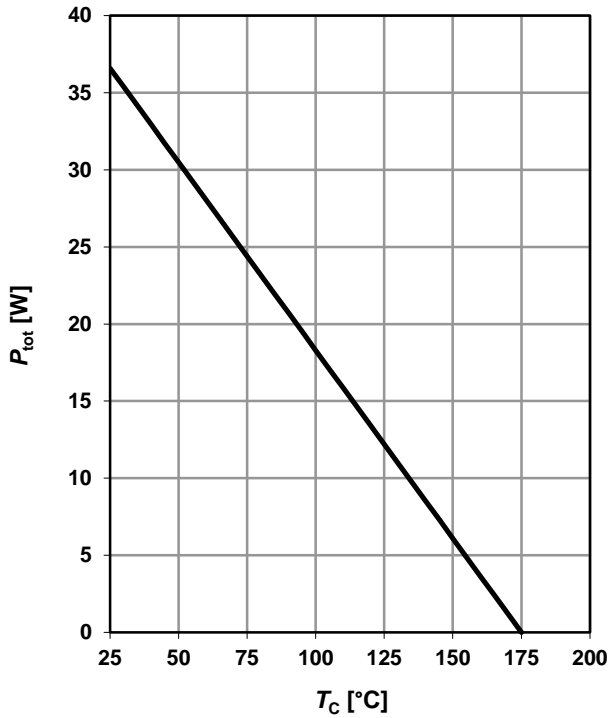
<sup>4)</sup>  $t_c$  is the time constant for the capacitive displacement current waveform (independent from  $T_j, I_{LOAD}$  and  $di/dt$ ), different from  $t_{rr}$ , which is dependent on  $T_j, I_{LOAD}, di/dt$ . No reverse recovery time constant  $t_{rr}$  due to absence of minority carrier injection.

<sup>5)</sup> Only capacitive charge occuring, guaranteed by design.

<sup>6)</sup> Repetitive condition defined by  $T_j \leq 175\text{ °C}$

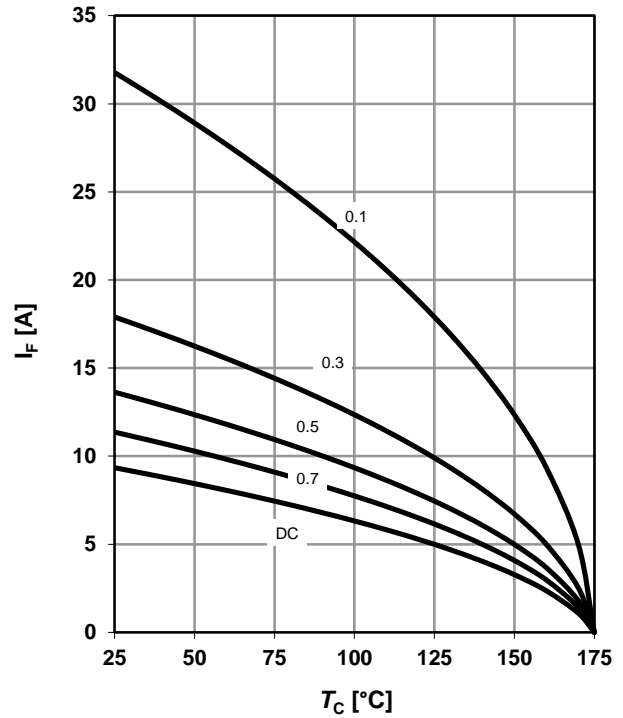
**1 Power dissipation**

$P_{tot}=f(T_C)$



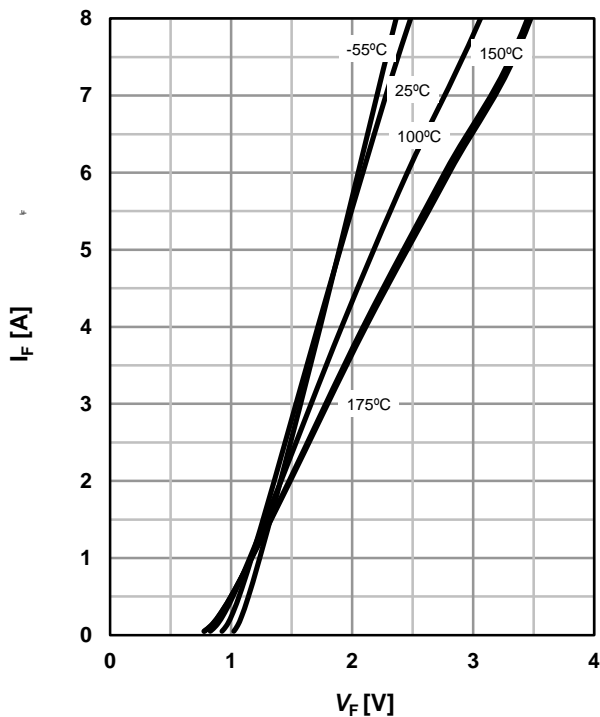
**2 Diode forward current**

$I_F=f(T_C)^4$ ;  $T_j \leq 175\text{ °C}$ ; parameter:  $D= t_p/T$



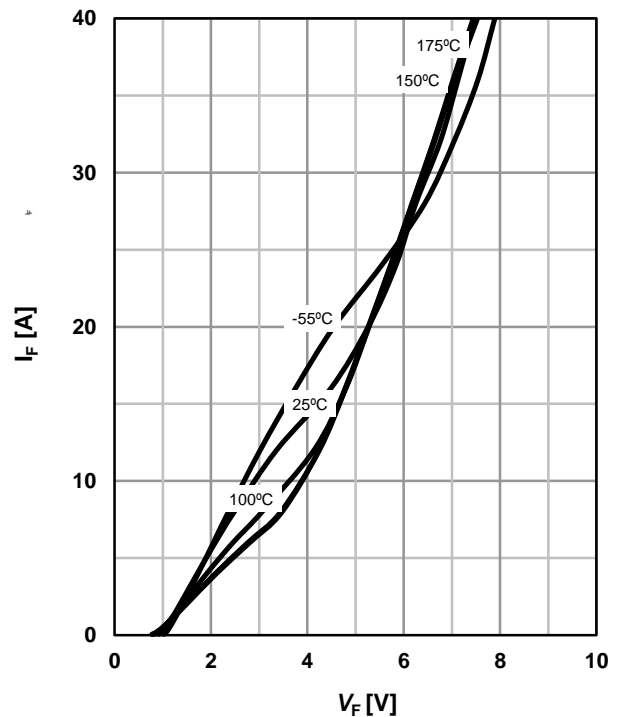
**3 Typ. forward characteristic**

$I_F=f(V_F)$ ;  $t_p=400\text{ }\mu\text{s}$ ; parameter:  $T_j$



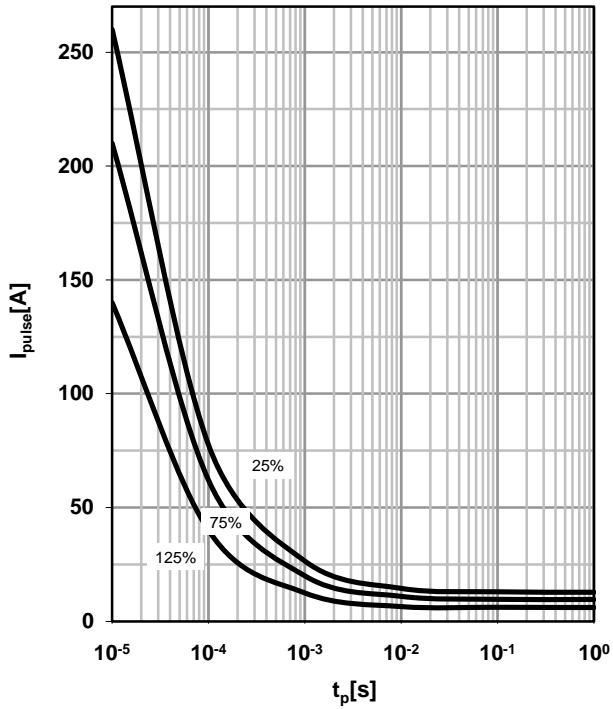
**4 Typ. forward characteristic in surge current mode**

$I_F=f(V_F)$ ;  $t_p=400\text{ }\mu\text{s}$ ; parameter:  $T_j$



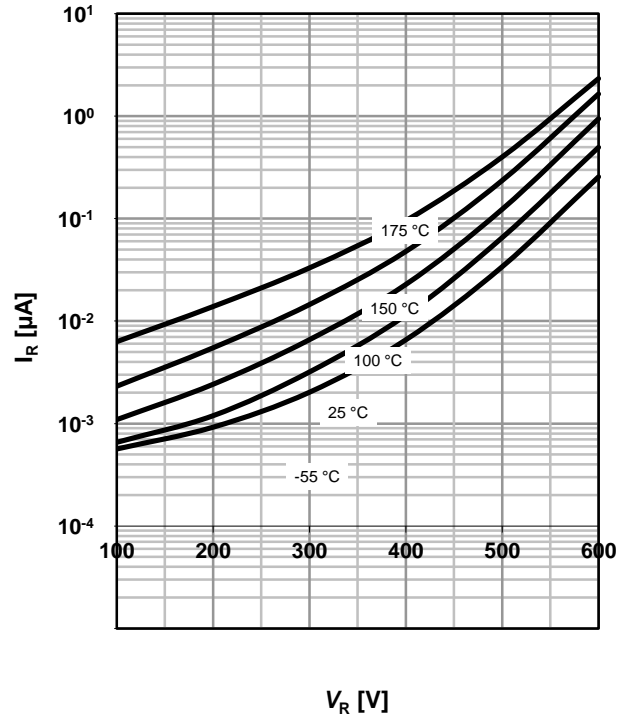
**5 Max. repetitive pulse current**

$I_{\text{pulse}}=f(t_p)^{4/5}$ ; parameter  $T_C$



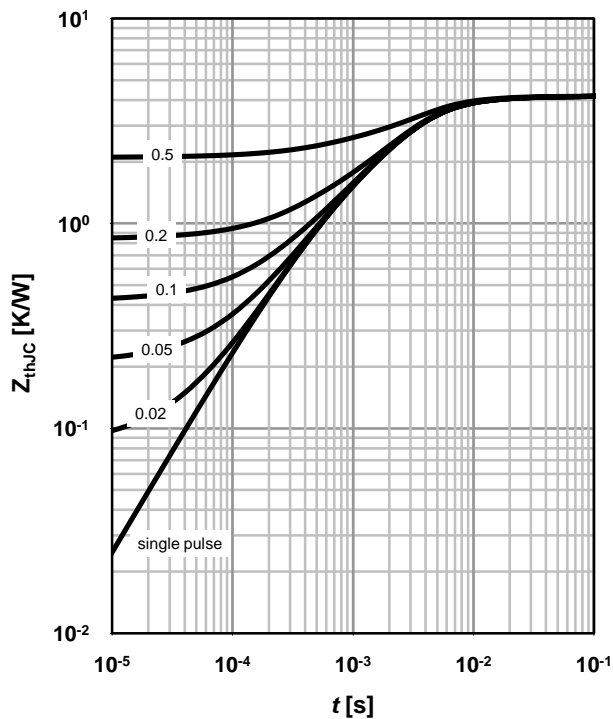
**6 Typ. reverse current vs. reverse voltage**

$I_R=f(V_R)$ ; parameter:  $T_j$



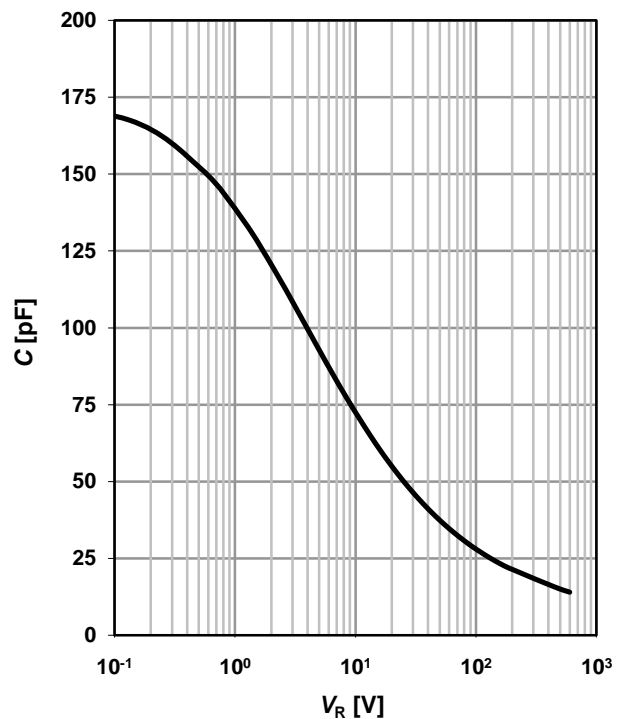
**7 Transient thermal impedance**

$Z_{\text{thJC}}=f(t_p)$ ; parameter:  $D = t_p/T$



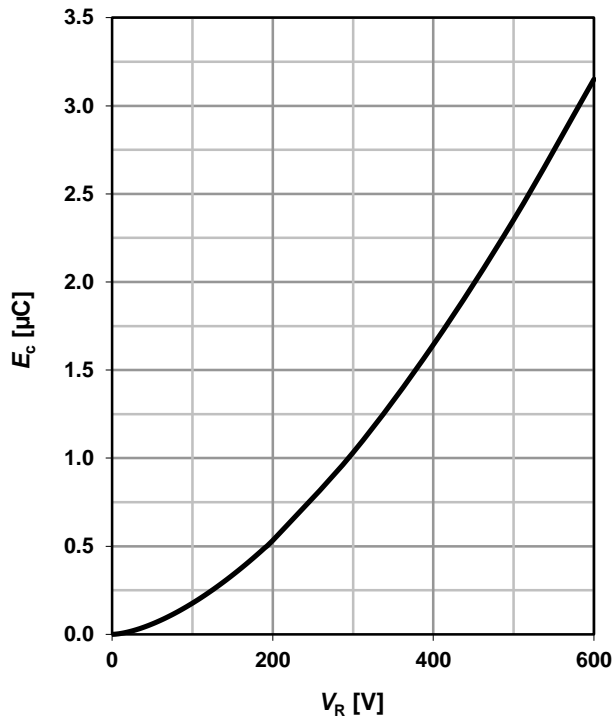
**8 Typ. capacitance vs. reverse voltage**

$C=f(V_R)$ ;  $T_C=25\text{ °C}$ ,  $f=1\text{ MHz}$



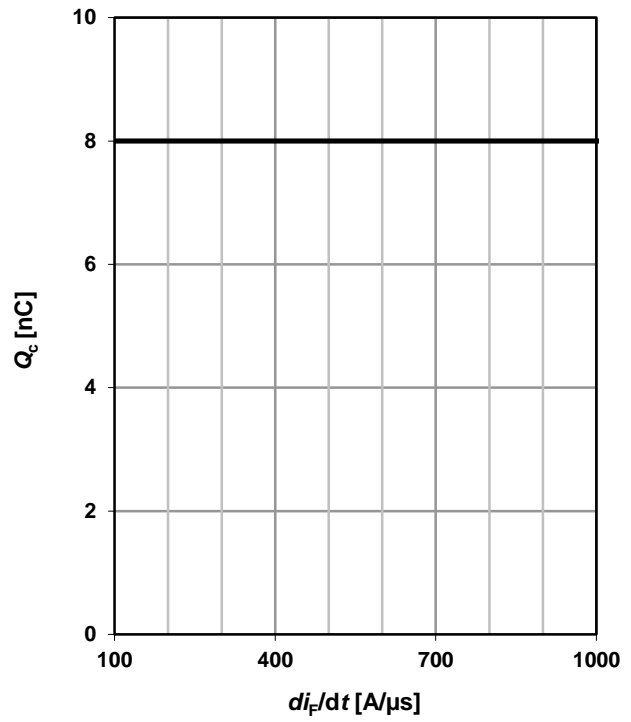
9 Typ. C stored energy

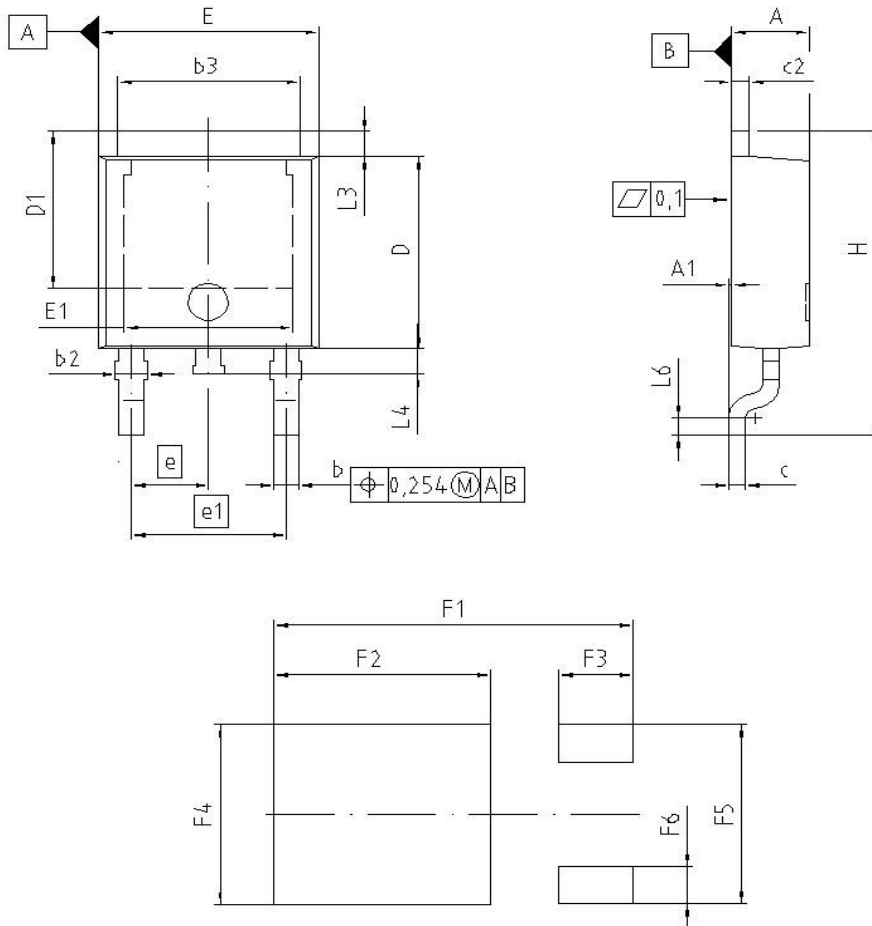
$$E_C = f(V_R)$$



10 Typ. capacitance charge vs. current slope

$$Q_C = f(di_F/dt)^5; T_j = 150 \text{ °C}; I_F \leq I_{F,max}$$



**Package Outline:PG-TO252-3-1/TO252-3-11/TO252-3-21**


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.159	2.413	0.085	0.095
A1	0.000	0.150	0.000	0.006
b	0.635	0.889	0.025	0.035
b2	0.650	1.150	0.026	0.045
b3	5.004	5.500	0.197	0.217
c	0.457	0.580	0.018	0.023
c2	0.460	0.980	0.018	0.039
D	5.969	6.223	0.235	0.245
D1	5.020	5.842	0.198	0.230
E	6.400	6.731	0.252	0.265
E1	4.850	5.207	0.191	0.205
e	2.286		0.090	
e1	4.572		0.180	
N	3		3	
H	9.400	10.480	0.370	0.413
L3	0.900	1.143	0.035	0.045
L4	0.584	0.950	0.023	0.037
L6	0.510	0.886	0.020	0.027
F1	10.500	10.700	0.413	0.421
F2	6.300	6.500	0.248	0.256
F3	2.100	2.300	0.083	0.091
F4	5.700	5.900	0.224	0.232
F5	5.660	5.860	0.222	0.231
F6	1.100	1.300	0.043	0.051

**REFERENCE**  
JEDEC TO252

**SCALE**

**EUROPEAN PROJECTION**

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