

MOSFET

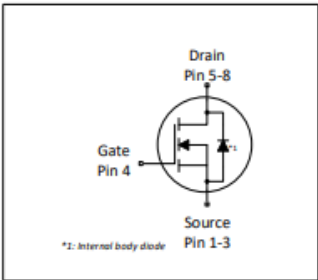
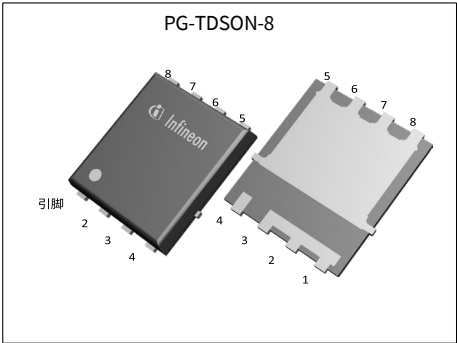
英飞凌高耐热60V OptiMOS™功率晶体管

特性

- 针对高性能 SMPS（例如同步整流）进行优化
- 额定温度为 175°C
- 100% 雪崩测试
- 卓越的耐热性
- N沟道
- 符合 JEDEC ¹⁾ 工业应用标准
- 无铅镀层；符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素
- 源极互连尺寸增大，焊点可靠性更高

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	1.45	mΩ
I_D	257	A
Q_{oss}	100	nC
$Q_G(0V..10V)$	89	nC



Type / Ordering Code	Package	Marking	Related Links
BSC014N06NST	PG-TDSON-8 FL	014N06NT	-

¹⁾ J-STD20 和 JESD22

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OptiMOS™功率晶体管，60V

1 最大额定值

除非另有规定， $T_j = 25^\circ\text{C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	257 182 31	A	$V_{GS}=10\text{ V}, T_C=25^\circ\text{C}$ $V_{GS}=10\text{ V}, T_C=100^\circ\text{C}$ $V_{GS}=10\text{ V}, T_A=25^\circ\text{C}, R_{thJA}=50\text{ K/W}^{2)}$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	1028	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	580	mJ	$I_D=50\text{ A}, R_{GS}=25\ \Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	188 3.0	W	$T_C=25^\circ\text{C}$ $T_A=25^\circ\text{C}, R_{thJA}=50\text{ K/W}^{2)}$
Operating and storage temperature	T_j, T_{stg}	-55	-	175	$^\circ\text{C}$	-

2 热特性

表3 热特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	0.5	0.8	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	20	K/W	-
Device on PCB, 6 cm ² cooling area ²⁾	R_{thJA}	-	-	50	K/W	-

¹⁾额定值指产品仅具有数据表指定的绝对最大值，保持外壳温度符合规定要求。其他外壳温度请参见图 2。需要根据实际环境条件降低额定值。

²⁾器件安装在 40 mm x 40 mm x 1.5 mm 环氧树脂印刷电路板 FR4 上，漏极连接用铜面积为 6 cm²（一层，70 μm 厚）。印刷电路板垂直放置在静止空气中。

³⁾详细信息请参见图 3

⁴⁾详细信息请参见图 13

OptiMOS™功率晶体管，60V

3 电气特性

除非另有规定， $T_j = 25\text{ }^{\circ}\text{C}$

表4 静态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	-	-	V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.1	2.8	3.3	V	$V_{DS}=V_{GS}$, $I_D=120\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.5 10	1 100	μA	$V_{DS}=60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ }^{\circ}\text{C}$ $V_{DS}=60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ }^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.2 1.6	1.45 2.2	m Ω	$V_{GS}=10\text{ V}$, $I_D=50\text{ A}$ $V_{GS}=6\text{ V}$, $I_D=12.5\text{ A}$
Gate resistance ¹⁾	R_G	-	2	3	Ω	-
Transconductance	g_{fs}	75	150	-	S	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=50\text{ A}$

表5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	6500	8125	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	1500	1875	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ¹⁾	C_{rss}	-	59	118	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	23	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=2\text{ }\Omega$
Rise time	t_r	-	10	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=2\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	43	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=2\text{ }\Omega$
Fall time	t_f	-	11	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=2\text{ }\Omega$

表6 栅极电荷特性²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	28	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	18	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	16	21	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	26	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	89	104	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.3	-	V	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	78	-	nC	$V_{DS}=0.1\text{ V}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	100	125	nC	$V_{DD}=30\text{ V}$, $V_{GS}=0\text{ V}$

¹⁾由设计标定，不受制于生产测试。

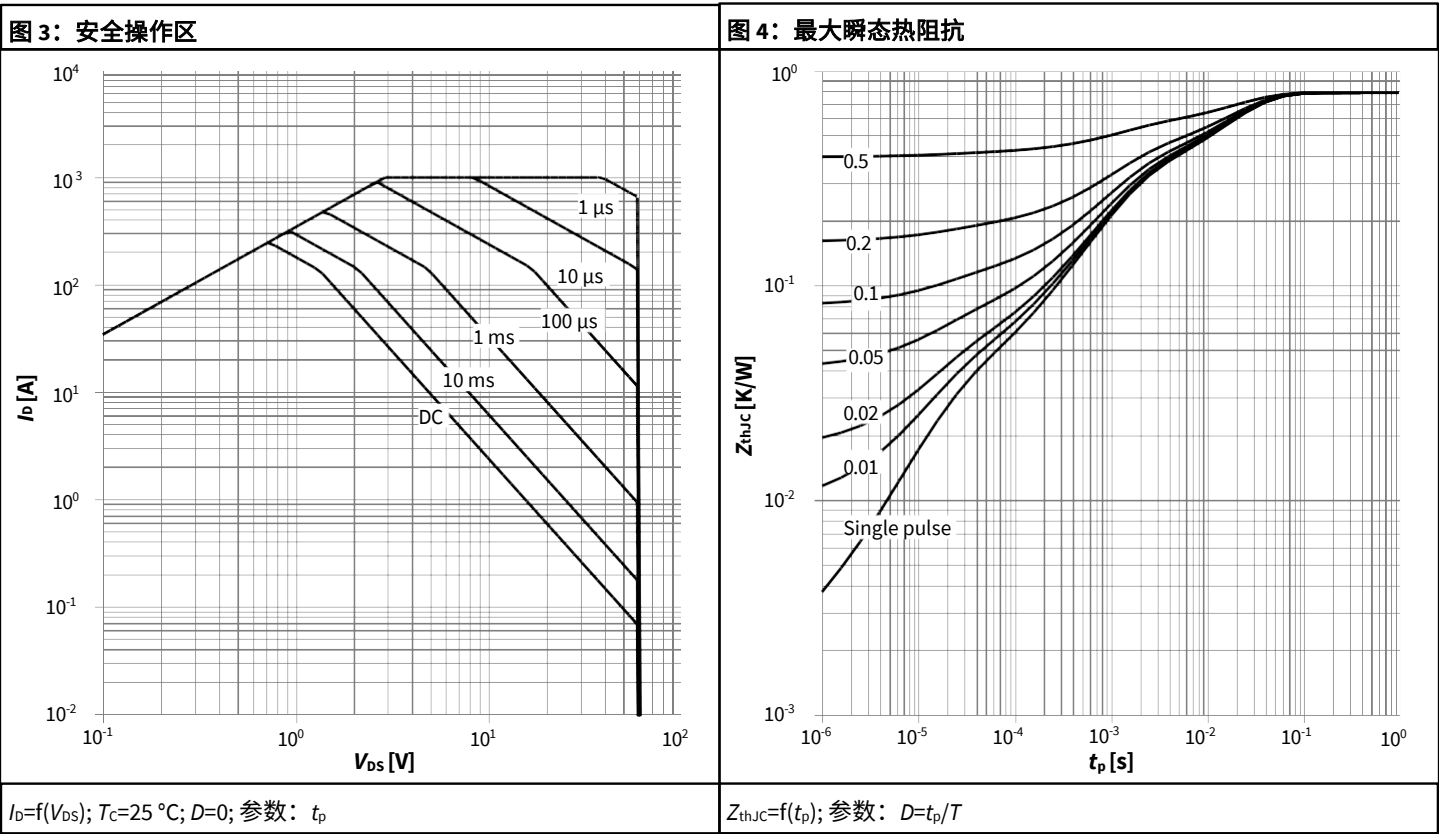
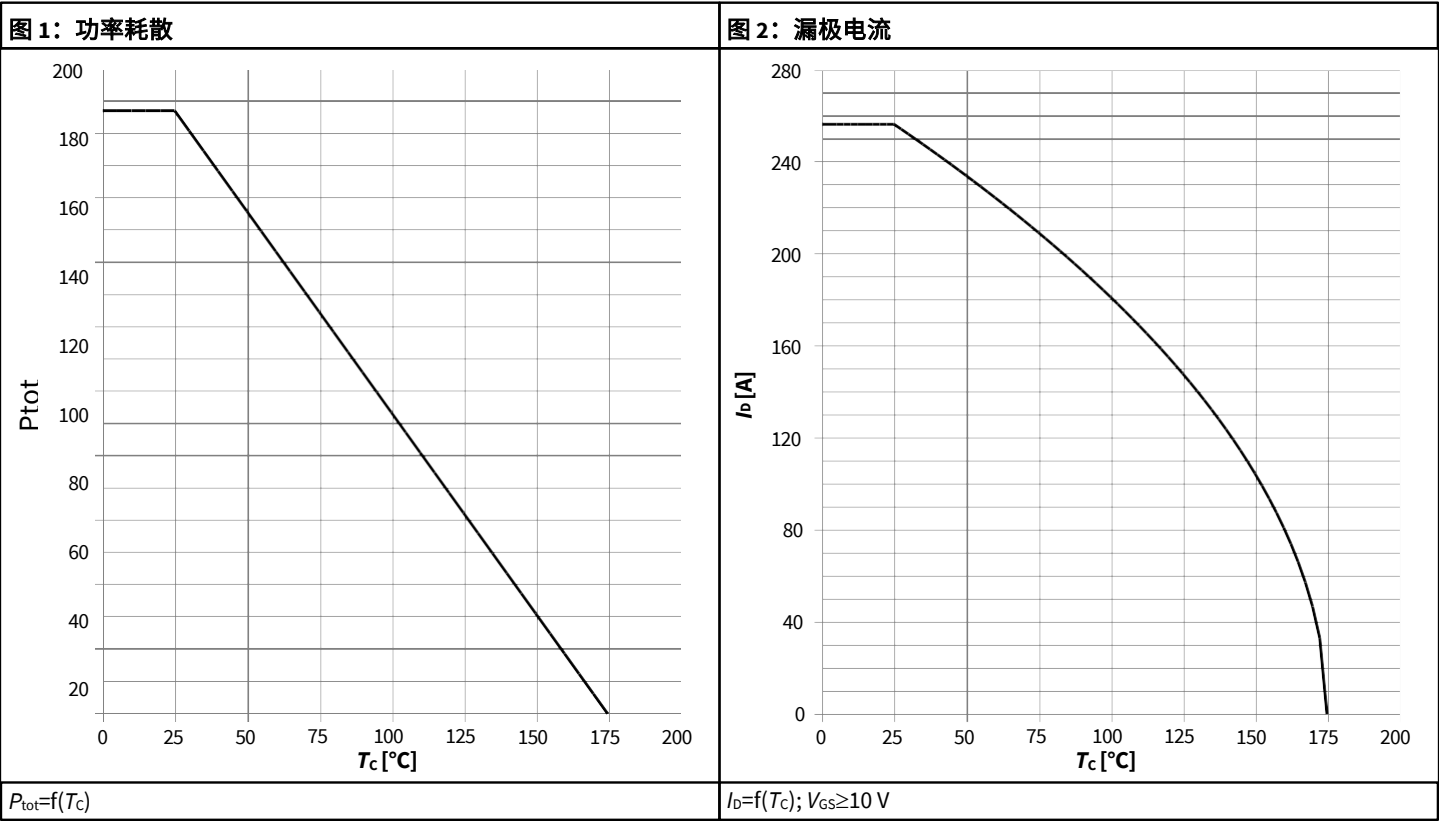
²⁾参数定义 请参见“栅极电荷波形”

表 7 反向二极管

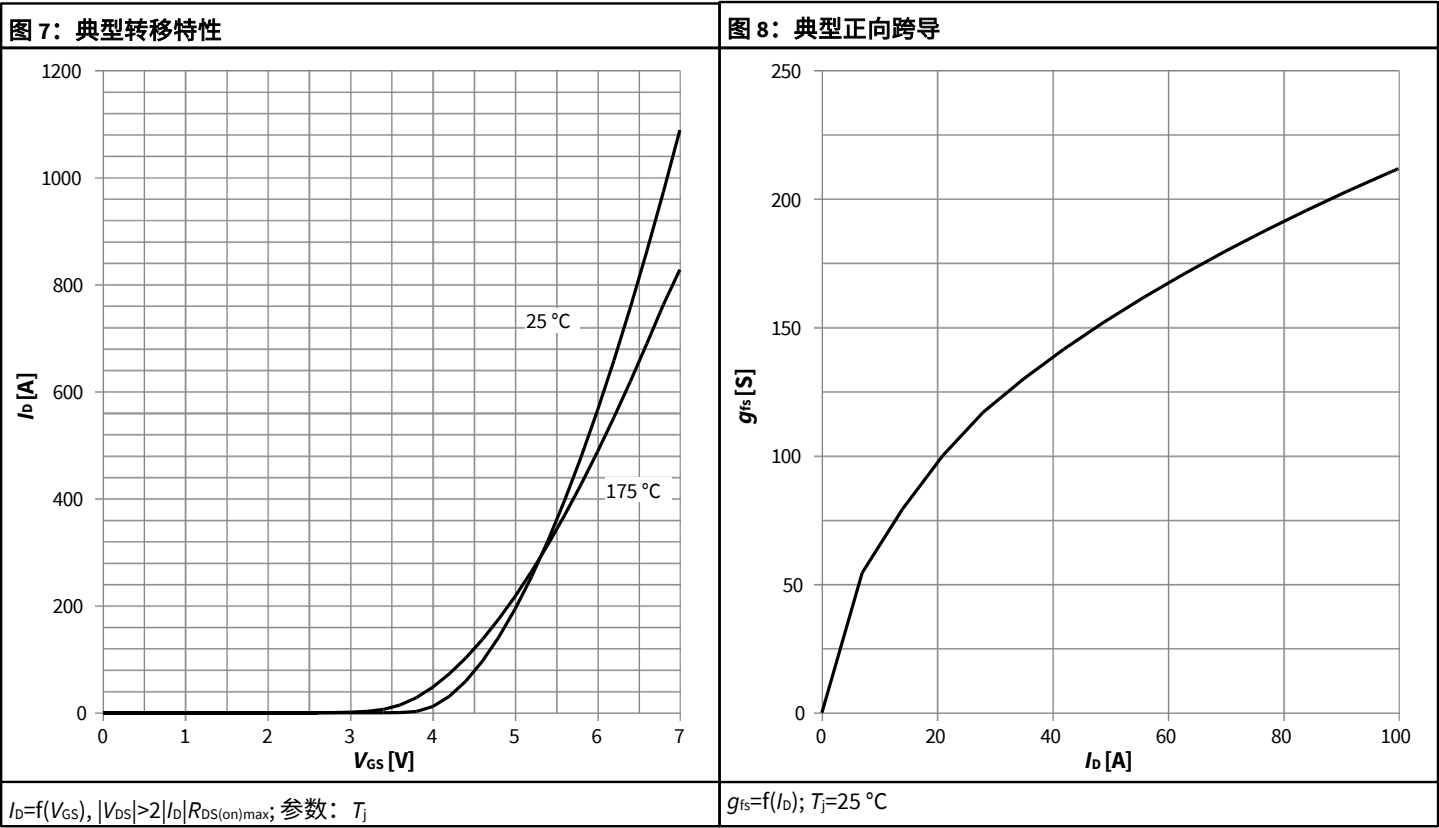
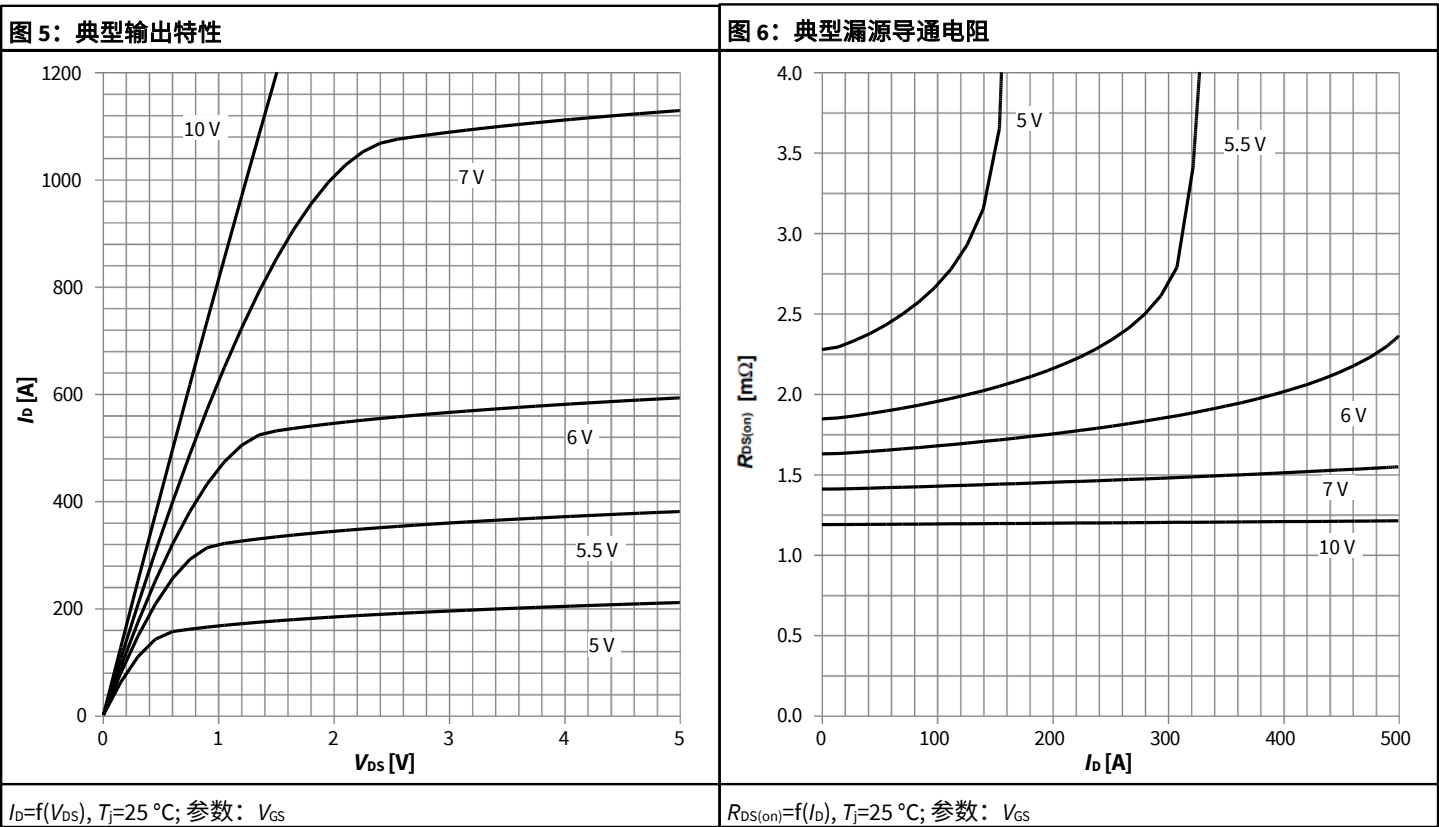
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	156	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	1028	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.84	1.2	V	$V_{GS}=0\text{ V}$, $I_F=50\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	-	52	83	ns	$V_R=30\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	139	-	nC	$V_R=30\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾由设计标定，不受制于生产测试。

4 电气特性图



OptiMOS™功率晶体管，60V



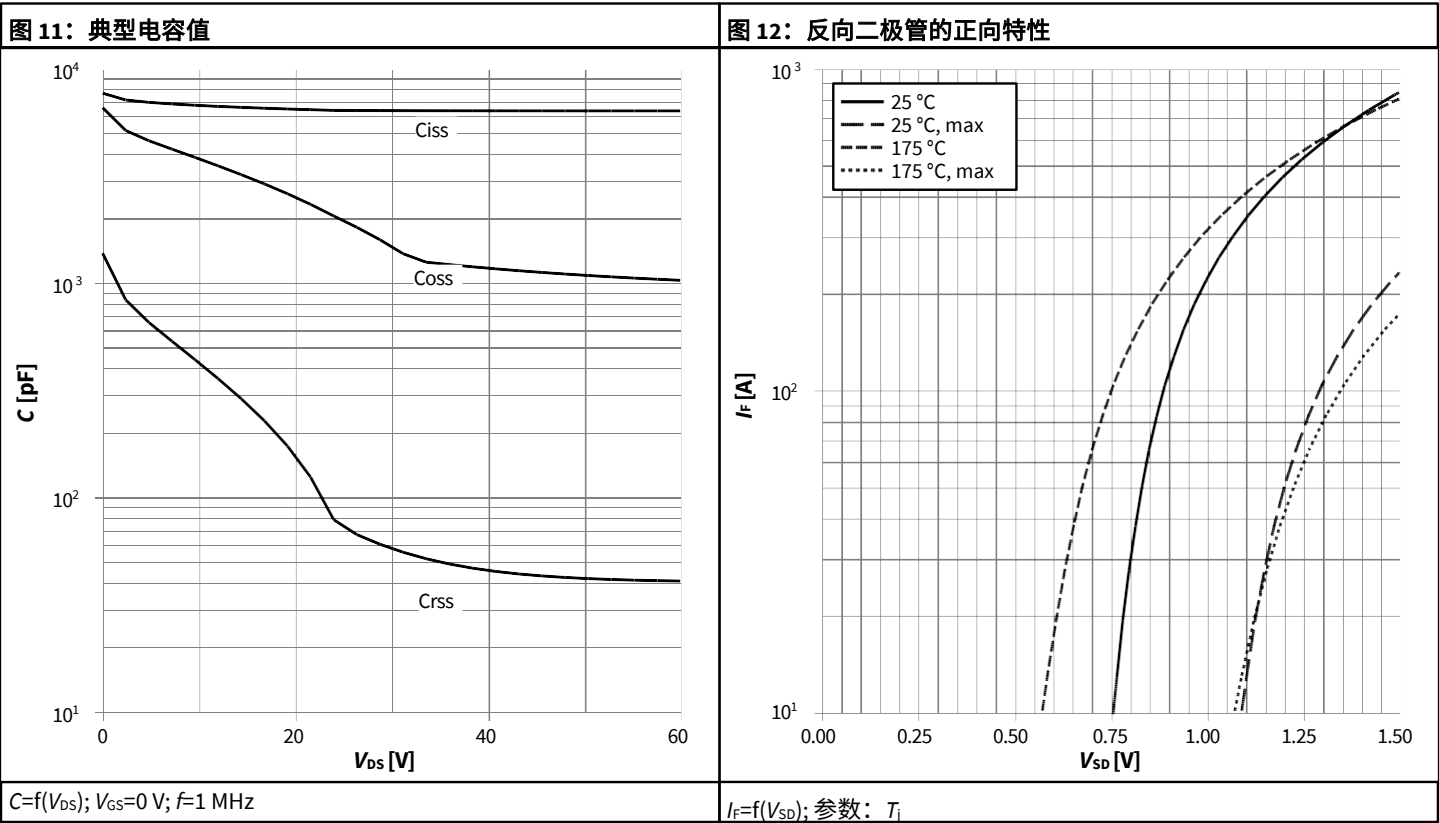
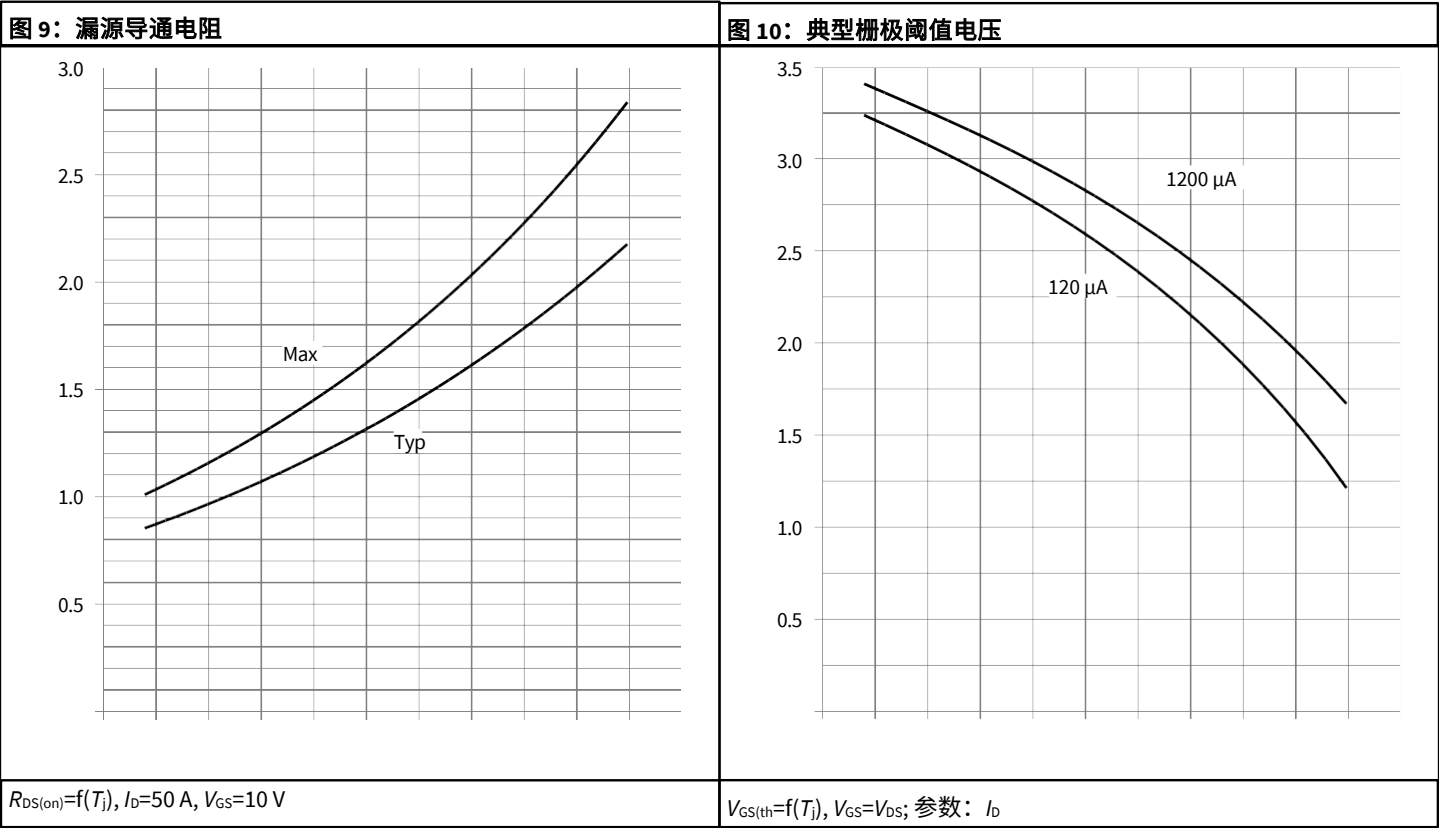
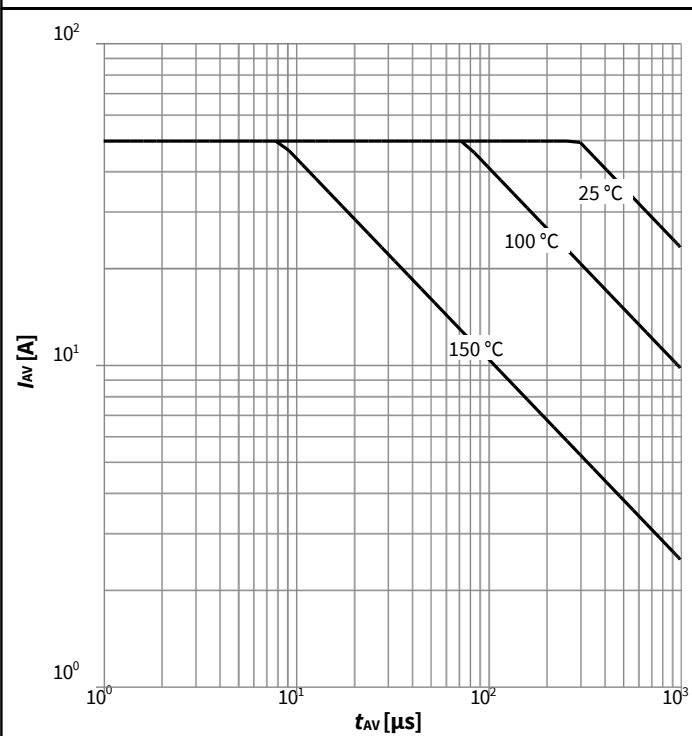
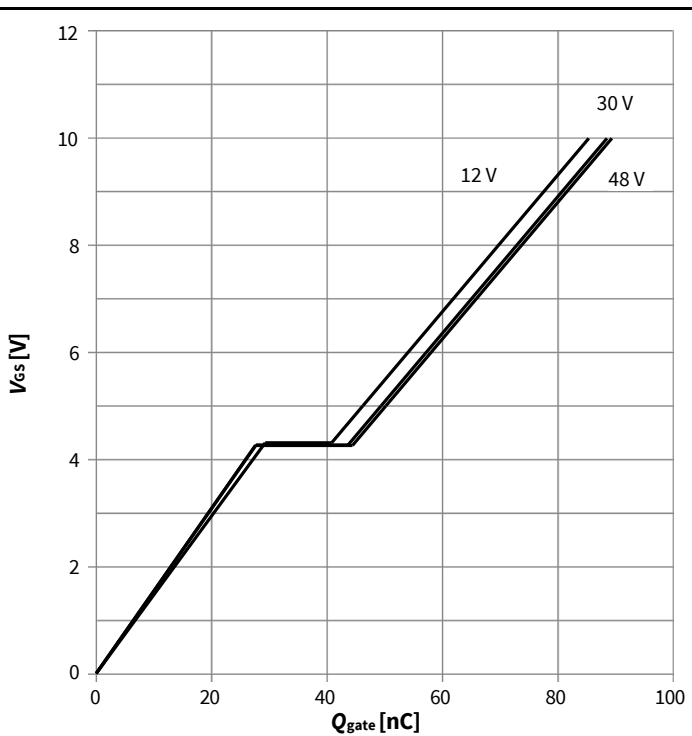


图 13：雪崩特性



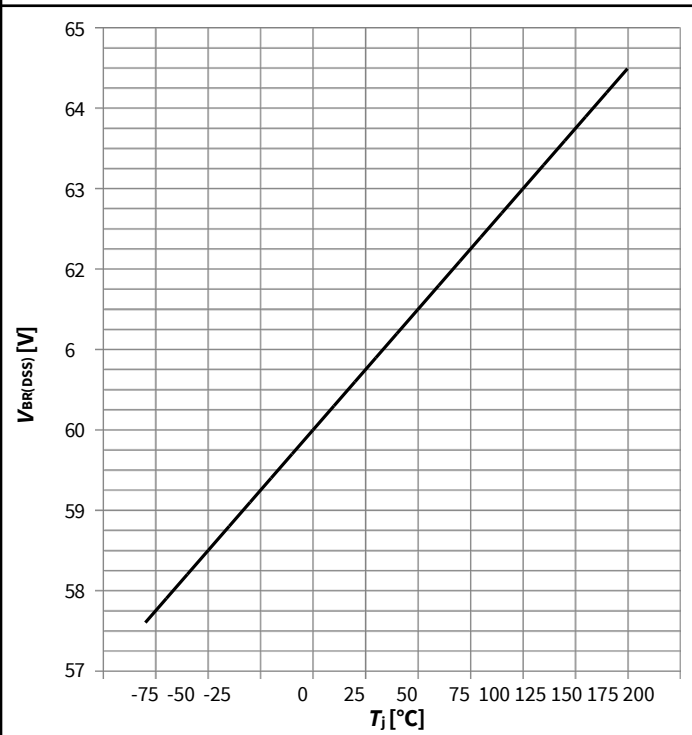
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j(start)}$

图 14：典型栅极电荷



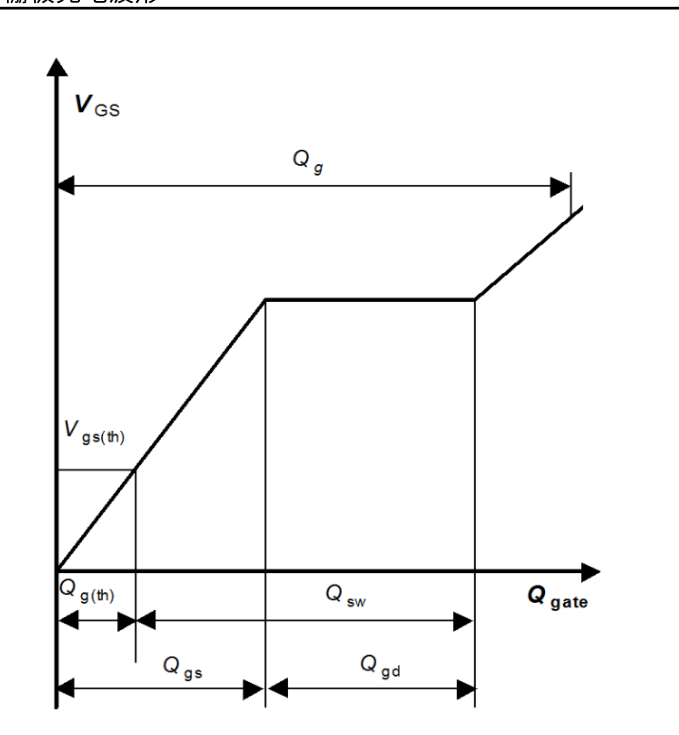
$V_{GS}=f(Q_{gate})$; $I_D=50\text{ A}$ pulsed; parameter: V_{DD}

图 15：最低漏源击穿电压

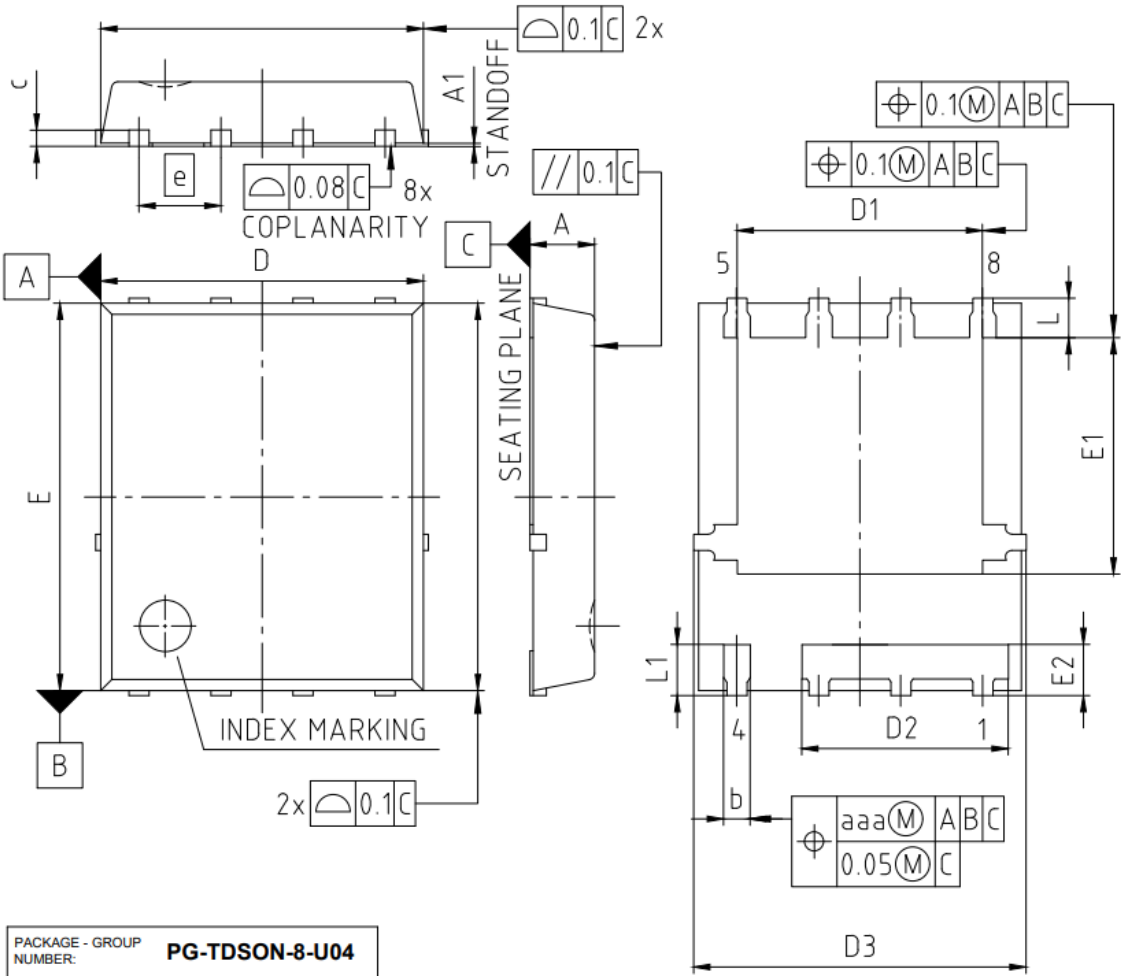


$V_{BR(DSS)}=f(T_j)$; $I_D=1\text{ mA}$

栅极充电波形



5 封装外形



PACKAGE - GROUP NUMBER: PG-TDSON-8-U04		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.90	1.20
A1	0	0.05
b	0.26	0.54
c	0.15	0.35
D	4.80	5.35
D1	3.70	4.40
D2	2.94	3.25
D3	5.05	5.38
E	5.70	6.10
E1	3.43	3.76
E2	0.69	0.89
e	1.27	
L	0.45	0.66
L1	0.69	0.90
aaa	0.10	0.25

- 1) EXCLUDING MOLD FLASH
- 2) REMOVAL ON MOLD GATE INTRUSION 0.1 MM
- 3) LEAD LENGTH UP TO ANTI FLASH LINE
- 4) ALL METAL SURFACES ARE PLATED, EXCEPT AREA OF CUT UP TO ANTI FLASH LINE

图 1 PG-TDSON-8 FL 外形图，尺寸单位为毫米

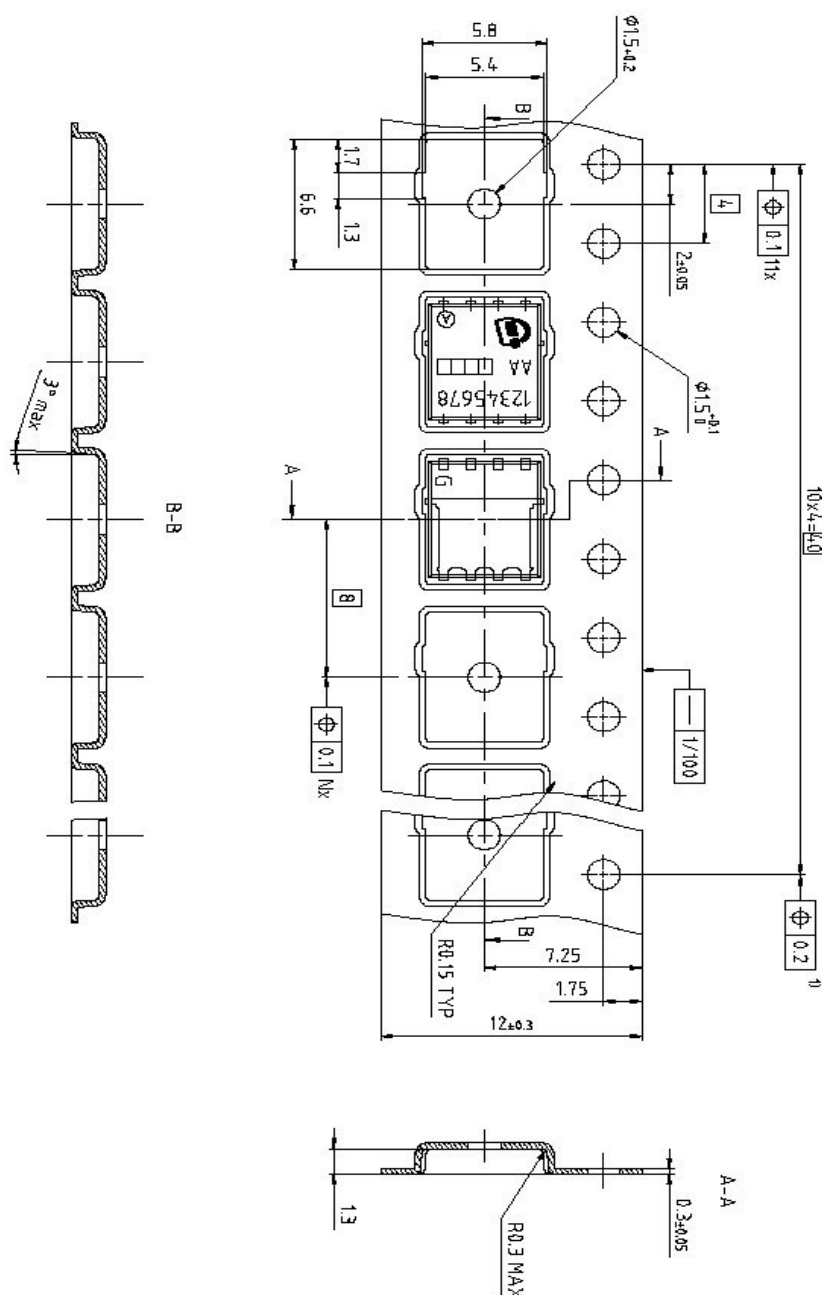


图2 封装外形胶带 (TDSO-8 FL)

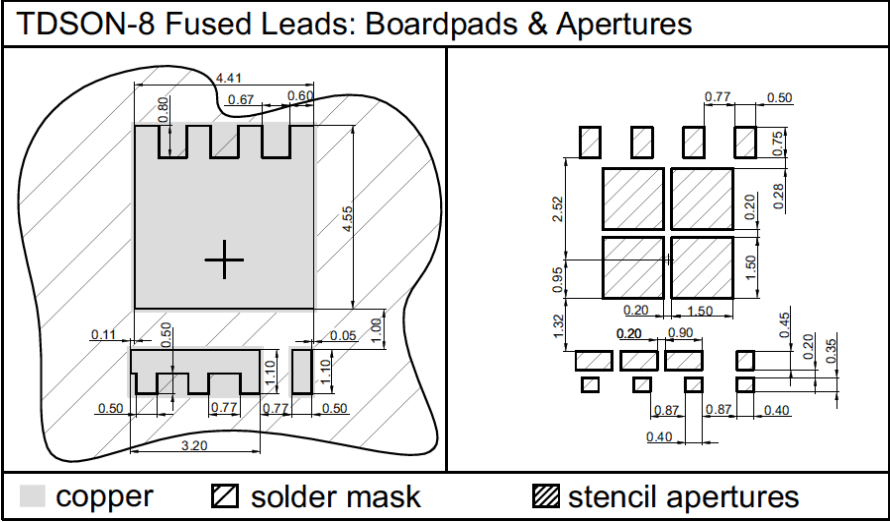


图 3 外形封装（TDSO8-8 FL）

修订记录

BSC014N06NST

Revision: 2022-08-09, Rev. 2.2

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2017-03-01	Release of final version
2.1	2020-06-17	Update current rating
2.2	2022-08-09	Update outline drawing and footnotes

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Edition 2025-04-21

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