



## STS5PF20V

P-CHANNEL 20V - 0.065Ω - 5A SO-8  
2.5V-DRIVE STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS5PF20V	20 V	< 0.080 Ω (@4.5V) < 0.10 Ω (@2.5V)	5 A

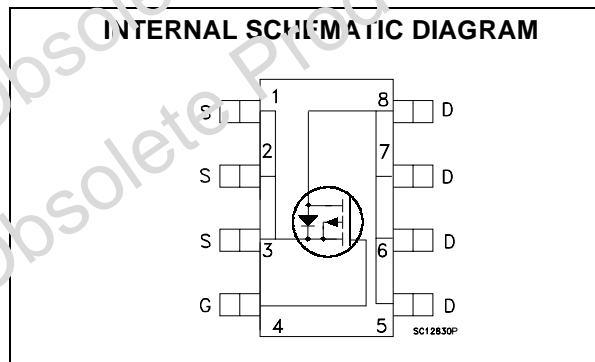
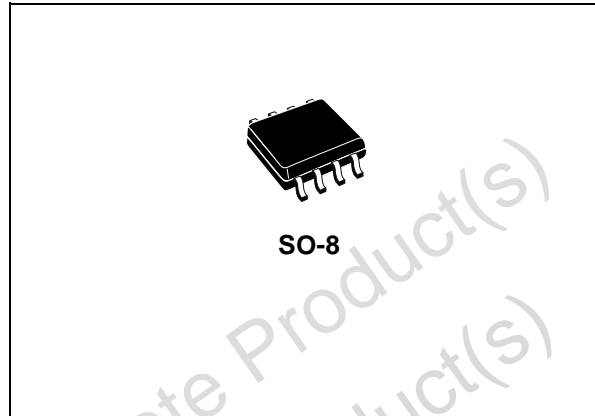
- TYPICAL R<sub>DS(on)</sub> = 0.065Ω (@4.5V)
- TYPICAL R<sub>DS(on)</sub> = 0.085Ω (@2.5V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.5V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

### DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely extremely low on-resistance when driven at 2.5V.

### APPLICATIONS

- POWER MANAGEMENT IN CELLULAR PHONES
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT



### ORDER CODES

PART NUMBER	MARKING	PACKAGE	PACKAGING
STS5PF20V	S5PF20V	SO-8	TAPE & REEL

## STS5PF20V

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	20	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	20	V
V <sub>GS</sub>	Gate- source Voltage	± 8	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	5	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	3.1	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	20	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	2.5	W

(•) Pulse width limited by safe operating area

Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

### THERMAL DATA

R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient Max	50	°C/W
T <sub>j</sub>	Max. Operating Junction Temperature	-55 to 150	°C
T <sub>stg</sub>	Storage Temperature	-55 to 150	°C

### ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0	20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating, T <sub>C</sub> = 125 °C			1 10	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 8V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	0.45			V
R <sub>D(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.5 A V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 2.5 A		0.065 0.085	0.080 0.10	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 2.5 A		6.6		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 15 V, f = 1 MHz, V <sub>GS</sub> = 0		412		pF
C <sub>oss</sub>	Output Capacitance			179		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			42.5		pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 10\text{ V}$ , $I_D = 2.5\text{ A}$		11		ns
$t_r$	Rise Time	$R_G = 4.7\Omega$ , $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		47		ns
$Q_g$	Total Gate Charge	$V_{DD} = 10\text{ V}$ , $I_D = 5\text{ A}$ ,		4.5	6	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 2.5\text{ V}$		0.73		nC
$Q_{gd}$	Gate-Drain Charge	(see test circuit, Figure 2)		1.75		nC

**SWITCHING OFF**

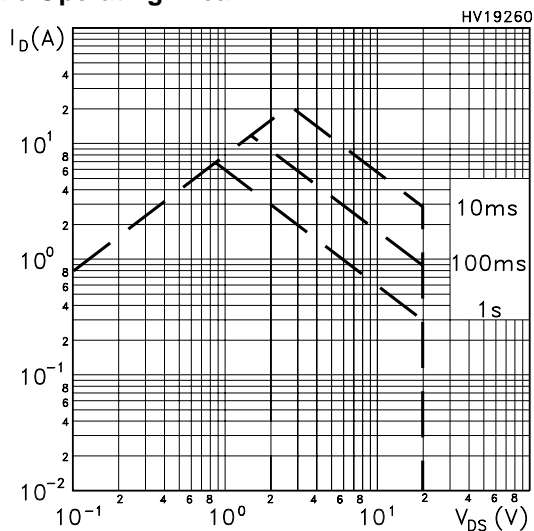
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 10\text{ V}$ , $I_D = 2.5\text{ A}$ ,		39		ns
$t_f$	Fall Time	$R_G = 4.7\Omega$ , $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		20		ns

**SOURCE DRAIN DIODE**

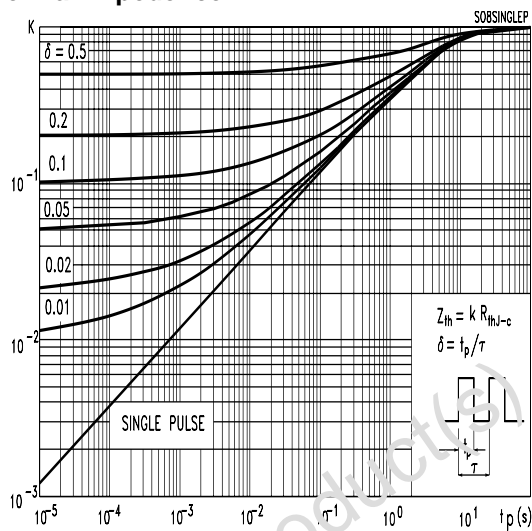
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				5	A
$I_{SDM}$	Source-drain Current (pulsed)				20	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 5\text{ A}$ , $V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 5\text{ A}$ , $di/dt = 100\text{ V}/\mu\text{s}$ ,		32		ns
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 16\text{ V}$ , $T_J = 150^\circ\text{C}$		12.8		nC
$I_{RRM}$	Reverse Recovery Current	(see test circuit, Figure 3)		0.8		A

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

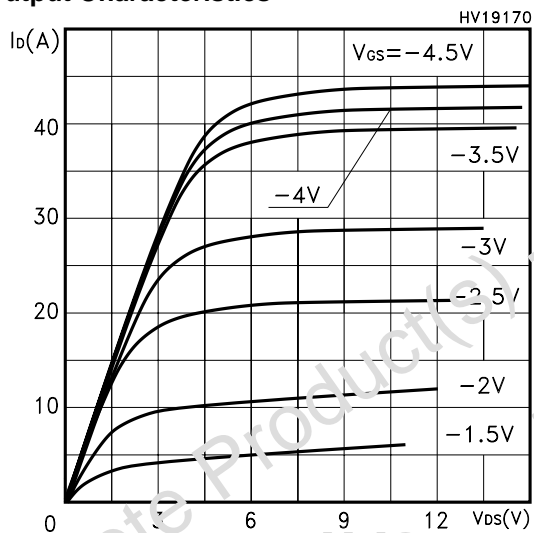
Safe Operating Area



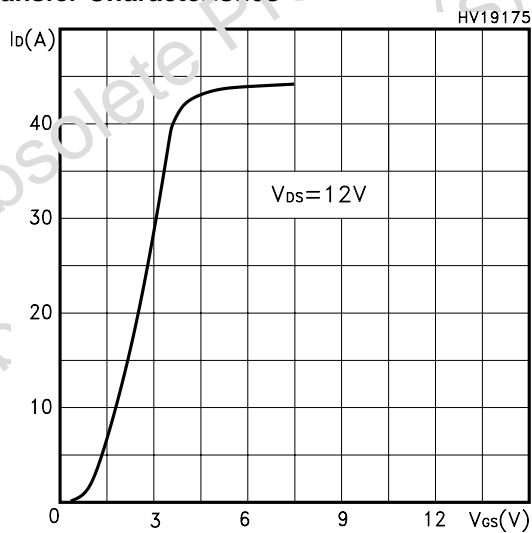
Thermal Impedance



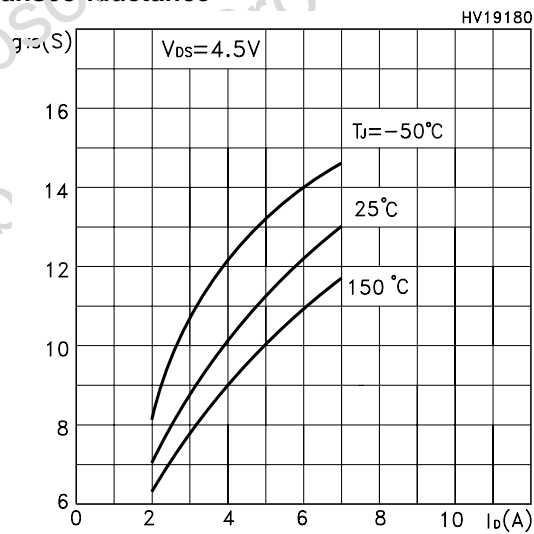
Output Characteristics



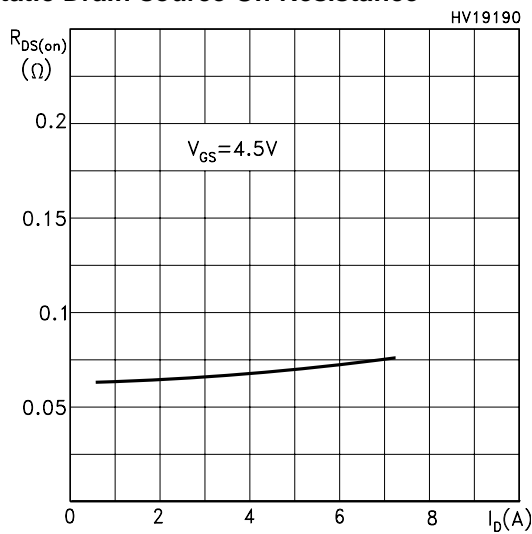
Transfer Characteristics



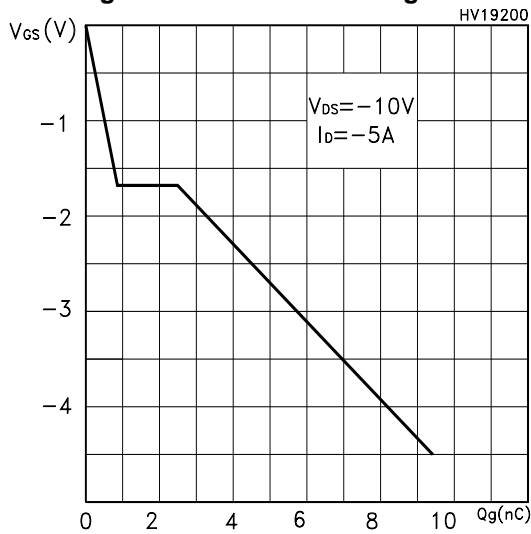
Transconductance



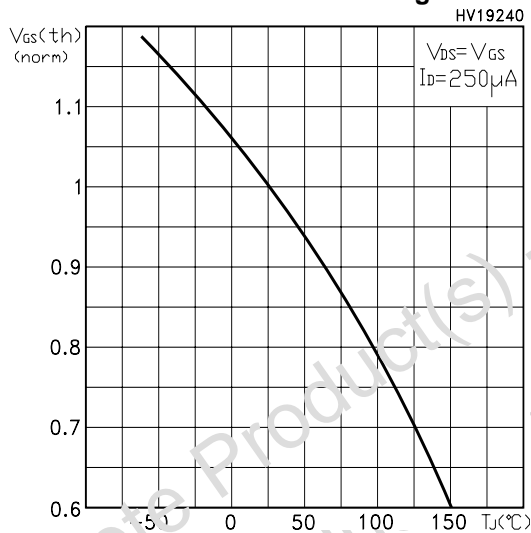
Static Drain-source On Resistance



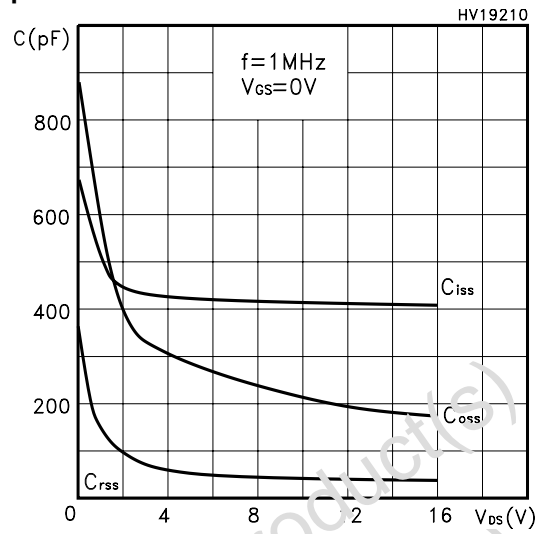
**Gate Charge vs Gate-source Voltage**



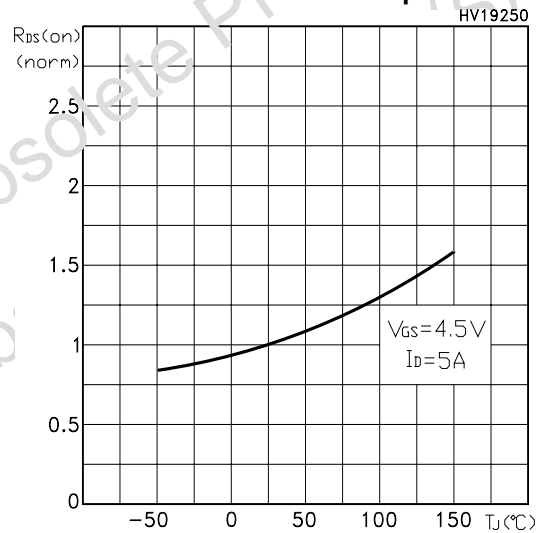
**Normalized Gate Threshold Voltage vs Temp.**



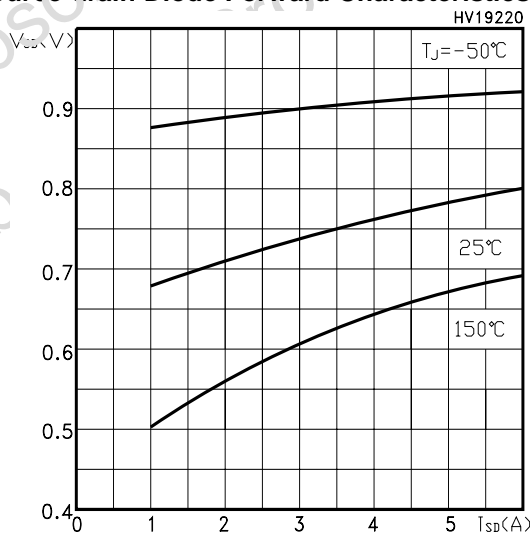
**Capacitance Variations**



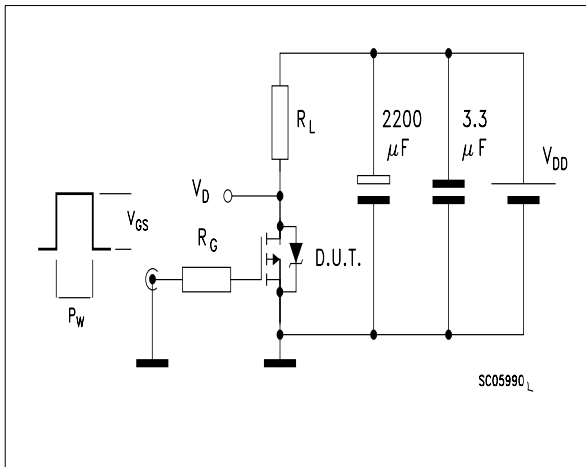
**Normalized On Resistance vs Temperature**



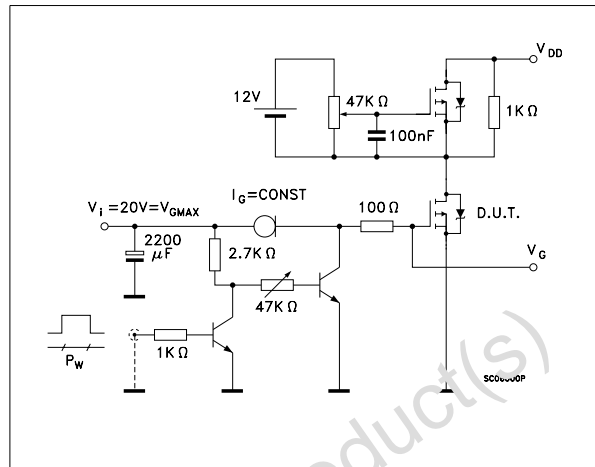
**Source-Drain Diode Forward Characteristics**



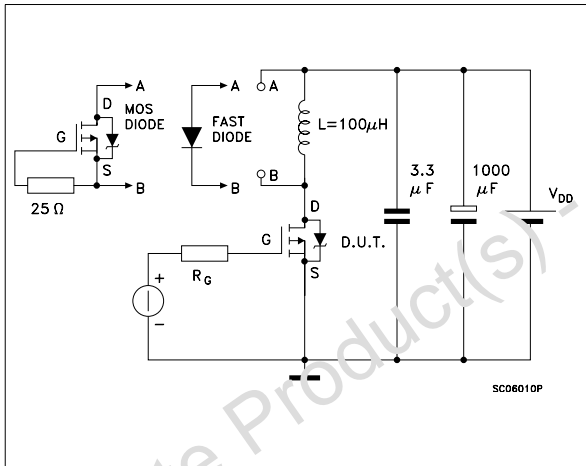
**Fig. 1: Switching Times Test Circuit For Resistive Load**



**Fig. 2: Gate Charge test Circuit**

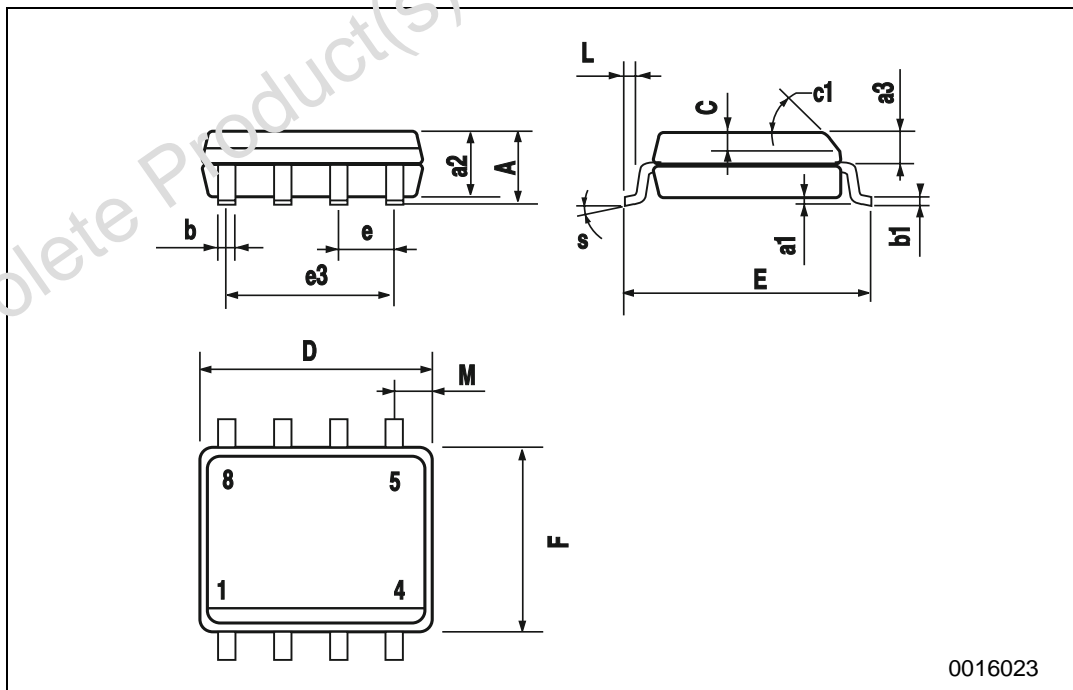


**Fig. 3: Test Circuit For Diode Recovery Behaviour**



SO-8 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



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