



## 1NNPP10

Power MOSFET

### 100V COMPLEMENTARY ENHANCEMENT MODE MOSFET H-BRIDGE (N-CHANNEL/P-CHANNEL)

#### DESCRIPTION

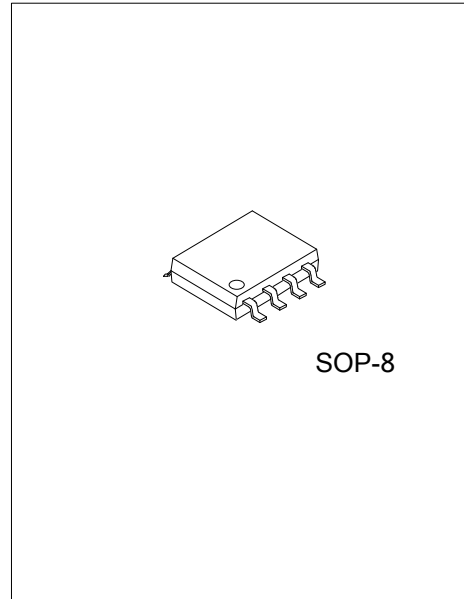
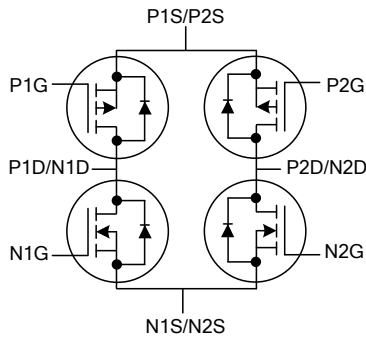
The UTC **1NNPP10** is a complementary enhancement mode MOSFET H-BRIDGE, it uses UTC advanced technology to provide customers low on resistance, low gate charge and low threshold voltage.

The UTC **1NNPP10** is universally applied in DC-AC Inverters and DC Motor control.

#### FEATURES

- \* N-CHANNEL
  - $I_D$ : 1A /  $V_{DSS}$ : 100V
- \* P-CHANNEL
  - $I_D$ : -0.9A /  $V_{DSS}$ : -100V
- \* High switching speed

#### SYMBOL



#### ORDERING INFORMATION

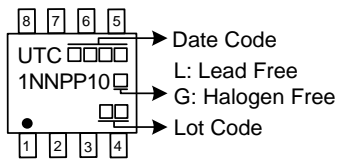
Ordering Number		Package	Packing
Lead Free	Halogen Free		
1NNPP10L-S08-R	1NNPP10G-S08-R	SOP-8	Tape Reel

<p>1NNPP10G-S08-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) S08: SOP-8</li> <li>(3) G: Halogen Free and Lead Free, , L: Lead Free</li> </ul>
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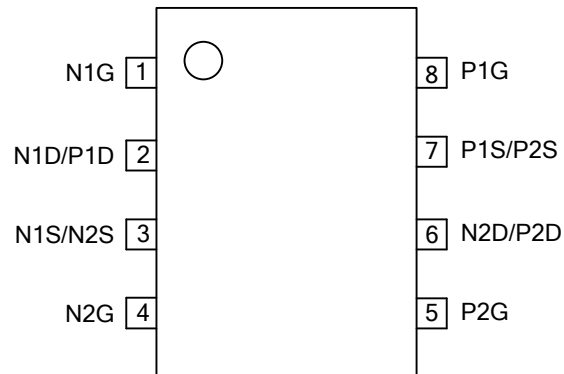
# 1NNPP10

Power MOSFET

## MARKING



## PIN CONFIGURATION



## ■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Gate-Source Voltage			V <sub>GSS</sub>	±20	±20	V
Drain-Source Voltage			V <sub>DSS</sub>	100	-100	V
Drain Current	Continuous	V <sub>GS</sub> =10V, T <sub>A</sub> =25°C, t ≤10 sec	I <sub>D</sub>	1	-0.9	A
	Pulsed	V <sub>GS</sub> =10V, T <sub>A</sub> =25°C (Note1)	I <sub>DM</sub>	4.3	-3.64	A
Power Dissipation			P <sub>D</sub>	0.87		W
				6.94		mW/°C
Junction Temperature			T <sub>J</sub>	-55 ~ +150		°C
Storage Temperature Range			T <sub>STG</sub>	-55 ~ +150		°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	144	°C/W

Note: Pulse width ≤ 300μs; duty cycle ≤ 2%. The pulse current is limited by the maximum junction temperature.

## ■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

### N-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	100			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V			0.5	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	Forward			+100	nA
		Reverse	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			-100
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0		3.0	V
Static Drain-Source On-State Resistance (Note 1)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.5A			0.7	Ω
		V <sub>GS</sub> =6V, I <sub>D</sub> =1.0A			0.9	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance (Note 3)	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		225		pF
Output Capacitance (Note 3)	C <sub>OSS</sub>			30		pF
Reverse Transfer Capacitance (Note 3)	C <sub>RSS</sub>			17		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 3)	Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =1A		20		nC
Gate to Source Charge (Note 3)	Q <sub>GS</sub>			2		nC
Gate to Drain Charge (Note 3)	Q <sub>GD</sub>			3		nC
Turn-ON Delay Time (Note 2, 3)	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =1A, R <sub>G</sub> ≈6Ω, V <sub>GS</sub> =10V		25.6		ns
Rise Time (Note 2, 3)	t <sub>R</sub>			15		ns
Turn-OFF Delay Time (Note 2, 3)	t <sub>D(OFF)</sub>			55		ns
Fall-Time (Note 2, 3)	t <sub>F</sub>			13.6		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>	T <sub>A</sub> =25°C (Note 2)			1	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>	T <sub>A</sub> =25°C (Note 3)			4.3	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =1.5A, V <sub>GS</sub> =0V		0.88	1.00	V

## ■ ELECTRICAL CHARACTERISTICS(CONT.)

### P-CHANNEL

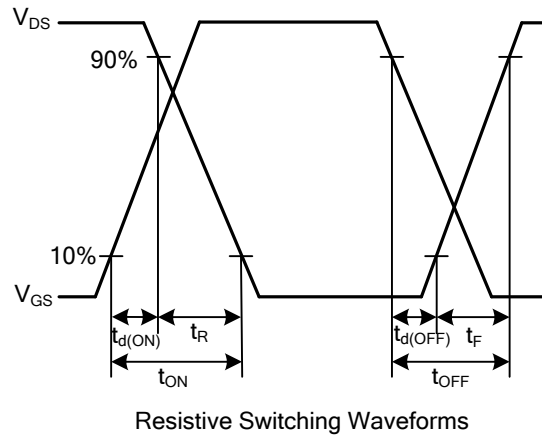
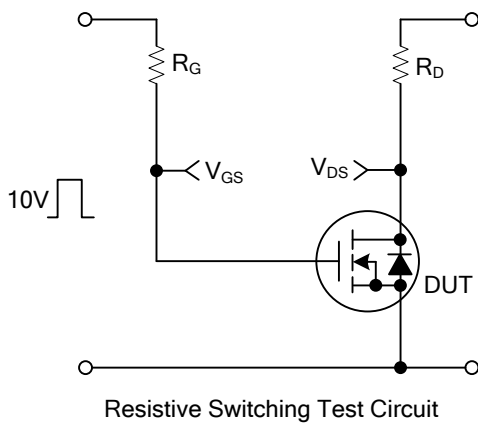
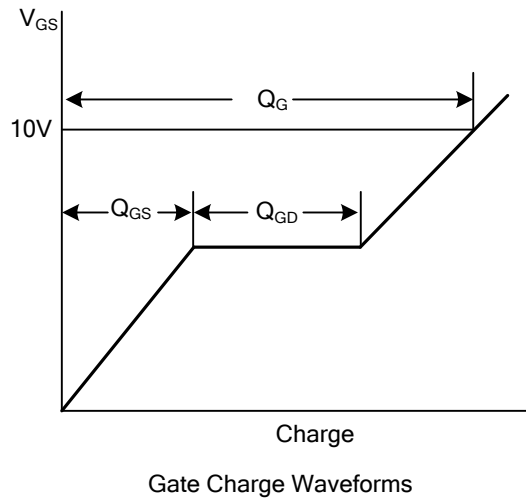
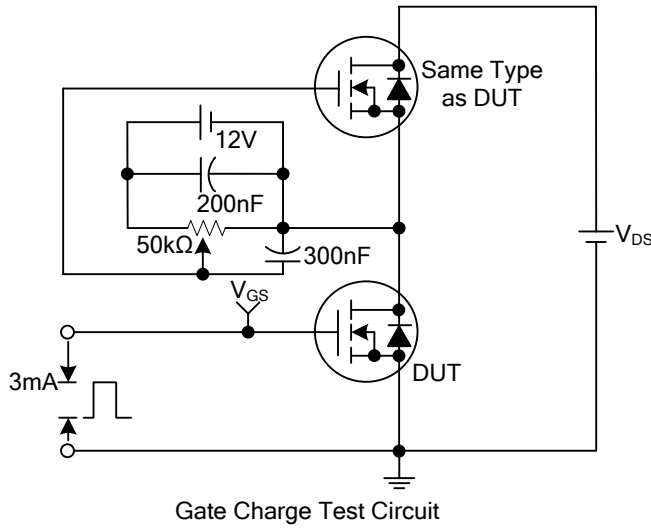
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=-250\mu A, V_{GS}=0V$	-100			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-100V, V_{GS}=0V$			-0.5	$\mu A$
Gate-Source Leakage Current	Forward	$V_{GS}=+20V, V_{DS}=0V$			+100	nA
	Reverse	$V_{GS}=-20V, V_{DS}=0V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0		-3.0	V
Static Drain-Source On-State Resistance(Note 1)	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-1.0A$			1	$\Omega$
		$V_{GS}=-6V, I_D=-0.5A$			1.45	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance (Note 3)	$C_{ISS}$	$V_{GS}=0V, V_{DS}=-25V, f=1.0MHz$		370		pF
Output Capacitance (Note 3)	$C_{OSS}$			32		pF
Reverse Transfer Capacitance (Note 3)	$C_{RSS}$			20		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 3)	$Q_G$	$V_{GS}=-10V, V_{DS}=-50V, I_D=-0.6A$		24		nC
Gate to Source Charge (Note 3)	$Q_{GS}$			1.5		nC
Gate to Drain Charge (Note 3)	$Q_{GD}$			1.8		nC
Turn-ON Delay Time (Note 2, 3)	$t_{D(ON)}$	$V_{DD}=-30V, I_D=-1A, R_G\approx 6\Omega, V_{GS}=-10V$		30		ns
Rise Time (Note 2, 3)	$t_R$			21		ns
Turn-OFF Delay Time (Note 2, 3)	$t_{D(OFF)}$			150		ns
Fall-Time (Note 2, 3)	$t_F$			48		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$	$T_A=25^\circ C$ (Note 2)			-0.90	A
Maximum Body-Diode Pulsed Current	$I_{SM}$	$T_A=25^\circ C$ (Note 3)			-3.64	A
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	$I_S=-1A, V_{GS}=0V$		-0.88	-1.00	V

Notes: 1. Measured under pulsed conditions. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

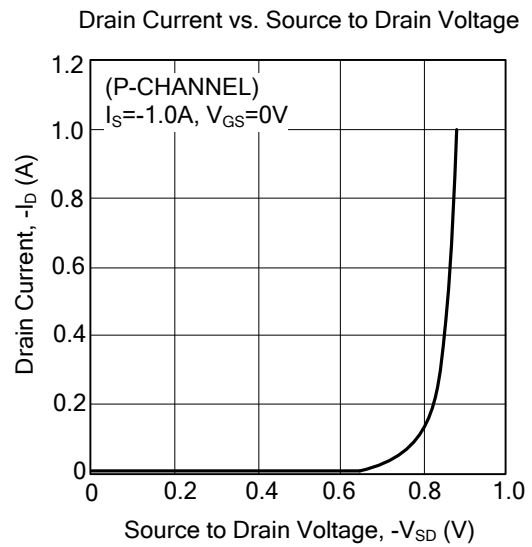
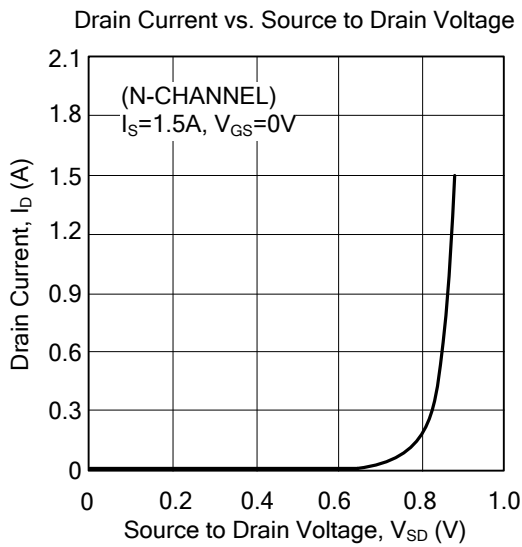
2. Switching characteristics are independent of operating junction temperature.

3. For design aid only, not subject to production testing

## ■ TEST CIRCUITS AND WAVEFORMS



## ■ TYPICAL CHARACTERISTICS



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