



# ITP17N50A

## N-Channel MOSFET

**Pb** Lead Free Package and Finish

### Applications:

- Adaptor
- Charger
- SMPS Standby Power

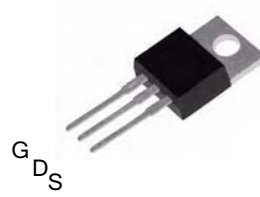
$V_{DSS}$	$R_{DS(ON)}$ (Typ.)	$I_D$
500 V	0.3 $\Omega$	17 A

### Features:

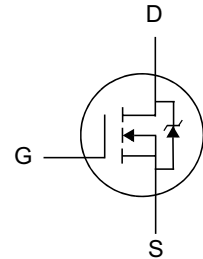
- RoHS Compliant
- Low ON Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve

### Ordering Information

PART NUMBER	PACKAGE	BRAND
ITP17N50A	TO-220	ITP17N50A



TO-220  
Not to Scale



### Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	ITP1 7N50A	Units
$V_{DSS}$	Drain-to-Source Voltage (NOTE *1)	500	V
$I_D$	Continuous Drain Current	17	A
$I_{D@ 100^\circ\text{C}}$	Continuous Drain Current	12	
$I_{DM}$	Pulsed Drain Current, $V_{GS}@ 10\text{V}$ (NOTE *2)	68	
$P_D$	Power Dissipation	150	W
	Derating Factor above $25^\circ\text{C}$	1.2	W/ $^\circ\text{C}$
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy L=10 mH	1000	mJ
$I_{AS}$	Pulsed Avalanche Rating	17	A
dv/dt	Peak Diode Recovery dv/dt (NOTE *3)	5.0	V/ns
TL TPKG	Maximum Temperature for Soldering Leads at 0.063 in (1.6 mm) from Case for 10 seconds Package Body for 10 seconds	300 260	$^\circ\text{C}$
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	

\* Drain Current Limited by Maximum Junction Temperature

**Caution:** Stresses greater than those listed in the "Absolute Maximum Ratings" Table may cause permanent damage to the device

### Thermal Resistance

Symbol	Parameter	ITP1 7N50A	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	0.83	$^\circ\text{C/W}$	Drain lead soldered to water cooled heatsink, $P_D$ adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	62		1 cubic foot chamber, free air.

**OFF Characteristics**  $T_J=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	500	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient, Figure 11.	--	0.6	--	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1.0	$\mu A$	$V_{DS}=500V, V_{GS}=0V$
		--	--	100		$V_{DS}=400V, V_{GS}=0V$ $T_J=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	--	--	0.1	$\mu A$	$V_{GS}=+30V$
	Gate-to-Source Reverse Leakage	--	--	-0.1		$V_{GS}=-30V$

**ON Characteristics**  $T_J=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance Figure 9 and 10.	--	0.30	0.40	$\Omega$	$V_{GS}=10V, I_D=7.5A$ (NOTE *4)
$V_{GS(TH)}$	Gate Threshold Voltage, Figure 12.	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	11	--	S	$V_{DS}=20V, I_D=17A$ (NOTE *4)

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$C_{iss}$	Input Capacitance	--	2700	--	$\mu F$	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$ Figure 14
$C_{oss}$	Output Capacitance	--	1020	--		
$C_{rss}$	Reverse Transfer Capacitance	--	325	--		
$Q_g$	Total Gate Charge	--	56	--	nC	$V_{DD}=250V$ $I_D=17A$
$Q_{gs}$	Gate-to-Source Charge	--	9	--		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	--	21	--		

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	20	--	ns	$V_{DD}=250V$ $I_D=17A$ $V_{GS}=10V$ $R_G=30\Omega$
$t_{rise}$	Rise Time	--	39	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	255	--		
$t_{fall}$	Fall Time	--	71	--		

**Source-Drain Diode Characteristics**  $T_C=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	--	--	17	A	Integral pn-diode in MOSFET
$I_{SM}$	Maximum Pulsed Current (Body Diode)	--	--	68	A	
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$I_S=17\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	--	340	--	ns	$V_{GS}=0\text{V}$
$Q_{rr}$	Reverse Recovery Charge	--	2825	--	nC	$I_F=17\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$

**Notes:**

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- \*1.  $T_J = +25^\circ\text{C}$  to  $+150^\circ\text{C}$ .
  - \*2. Repetitive rating; pulse width limited by maximum junction temperature.
  - \*3.  $I_{SD}=17\text{A}$   $di/dt \leq 100\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ ,  $T_J=+150^\circ\text{C}$ .
  - \*4. Pulse width  $\leq 380\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Test Circuits and Waveforms

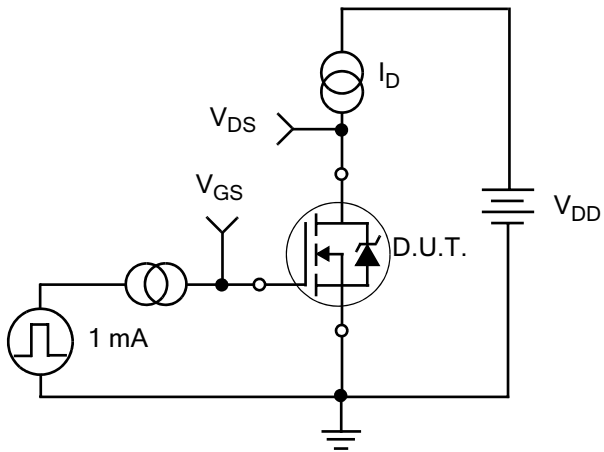


Figure 1. Gate Charge Test Circuit

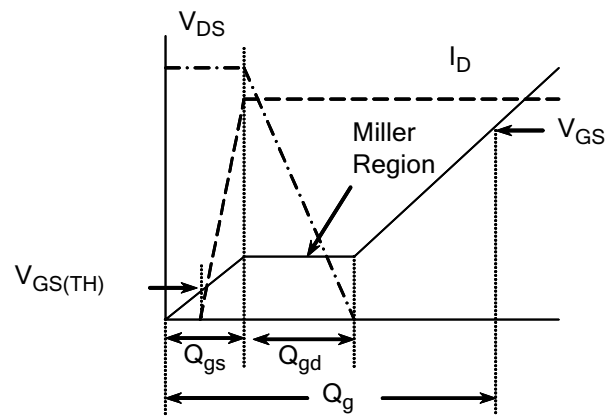


Figure 2. Gate Charge Waveform

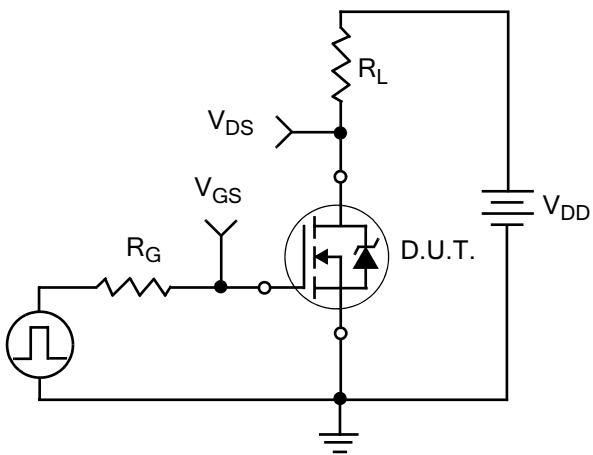


Figure 3. Resistive Switching Test Circuit

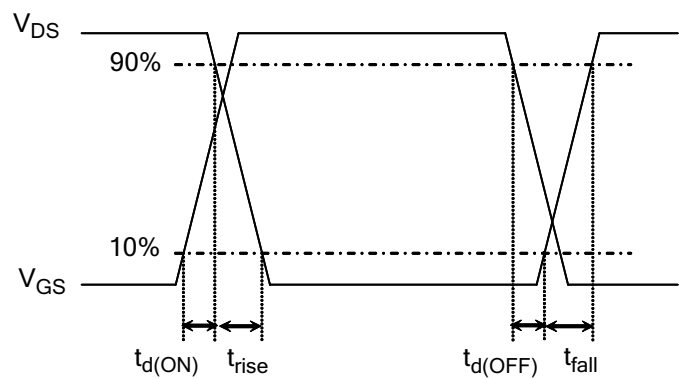


Figure 4. Resistive Switching Waveforms

Test Circuits and Waveforms

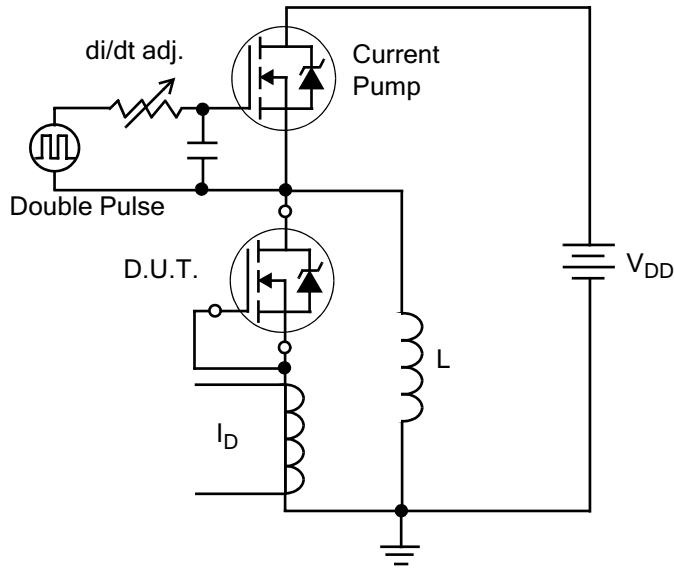


Figure 5. Diode Reverse Recovery Test Circuit

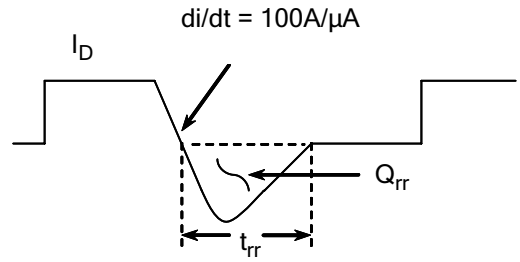


Figure 6. Diode Reverse Recovery Waveform

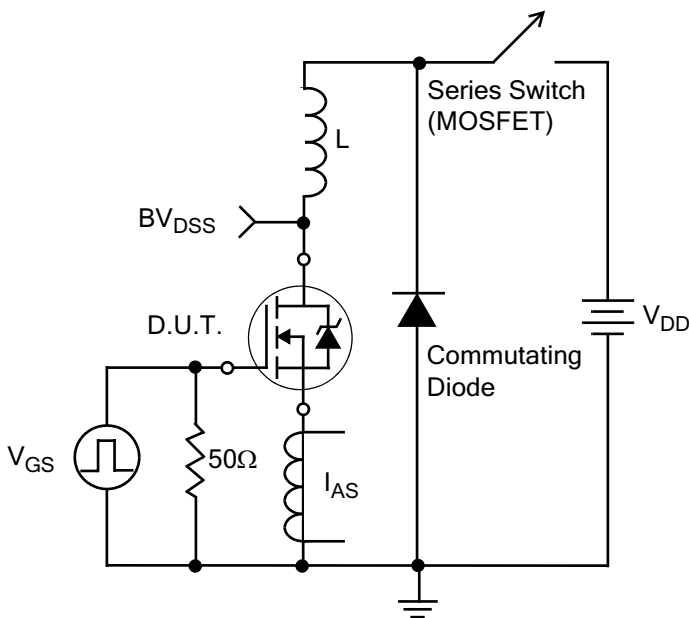


Figure 7. Unclamped Inductive Switching Test Circuit

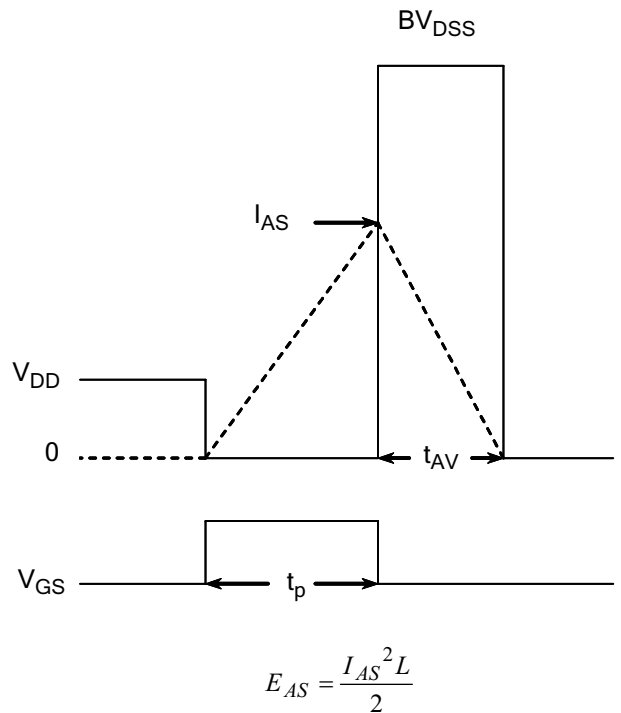


Figure 8. Unclamped Inductive Switching Waveforms

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