



# FTP02N04NA

## N-Channel MOSFET

 **Lead Free Package and Finish**

### Applications:

- Adaptor
- Charger
- SMPS

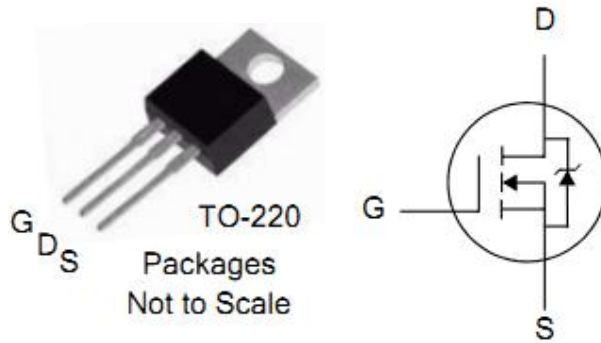
$V_{DSS}$	$R_{DS(ON)}$ (Typ.)	$I_{D(silicon\ limited)}$	$I_{D(Package\ limited)}$
40V	1.8m $\Omega$	300A	120A

### Features:

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

### Ordering Information

PART NUMBER	PACKAGE	BRAND
FTP02N04NA	TO-220	<b>IPS</b>



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

Symbol	Parameter	FTP02N04NA	Units
$V_{DSS}$	Drain-to-Source Voltage	40	V
$I_D$	Continuous Drain Current	300	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	197	A
$I_{DM}$	Pulsed Drain Current (NOTE *1)	1200	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy(NOTE *2)	800	mJ
$P_D$	Power Dissipation	312.5	W
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	150, -55 to 150	

### Thermal Resistance

Symbol	Parameter	Max.	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	0.4	$^\circ\text{C}/\text{W}$	Water cooled heatsink, $P_D$ adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	62.5		1 cubic foot chamber, free air.



# FTP02N04NA

## OFF Characteristics $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	40	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1	$\mu A$	$V_{DS}=40V, V_{GS}=0V$ $T_C=25^\circ\text{C}$
		--	--	100		$V_{DS}=32V, V_{GS}=0V$ $T_C=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	--	--	+100	nA	$V_{GS}=+20V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-20V$

## ON Characteristics $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	1.8	2.3	m $\Omega$	$V_{GS}=10V, I_D=100A$
$V_{GS(TH)}$	Gate Threshold Voltage	1	--	3	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Pulse width $\leq 300\mu s$ ; duty cycle $\leq 2\%$						

## Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_g$	Gate resistance	--	1.7	--	$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$
$C_{iss}$	Input Capacitance	--	14360	--	$\mu F$	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$
$C_{oss}$	Output Capacitance	--	1177	--		
$C_{rss}$	Reverse Transfer Capacitance	--	950	--		
$Q_g$	Total Gate Charge	--	250	--	nC	$I_D=100A, V_{DD}=20V$ $V_{GS}=10V$
$Q_{gs}$	Gate-to-Source Charge	--	57	--		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	--	60	--		



# FTP02N04NA

## 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)	--	--	300	A	
$I_{SM}$	Maximum Pulsed Current (Body Diode)	--	--	1200	A	
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$I_{SD}=100\text{A}, V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	--	40	--	ns	$I_F=50\text{A}$ $di/dt=100\text{A}/\mu\text{s}$
$Q_{rr}$	Reverse Recovery Charge	--	45	--	$\mu\text{C}$	
Pulse width $\leq 300\mu\text{s}$ ; duty cycle $\leq 2\%$						

### Notes:

\*1. Repetitive rating; pulse width limited by maximum junction temperature.

\*2.  $L=10\text{mH}$ ,  $I_D=126.5\text{A}$ , Start  $T_J=25^\circ\text{C}$

## Test Circuits and Waveforms

Figure 14. Gate Charge Test Circuit

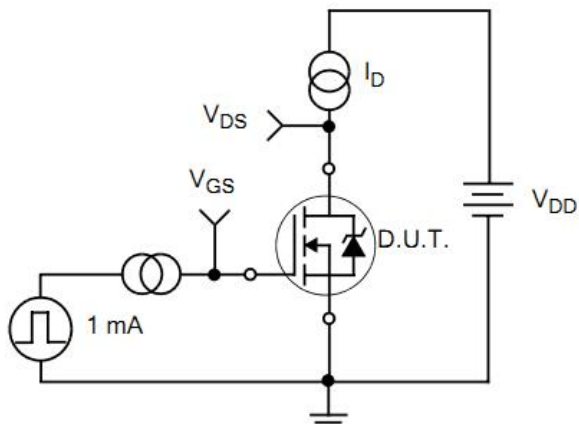


Figure 15. Gate Charge Waveforms

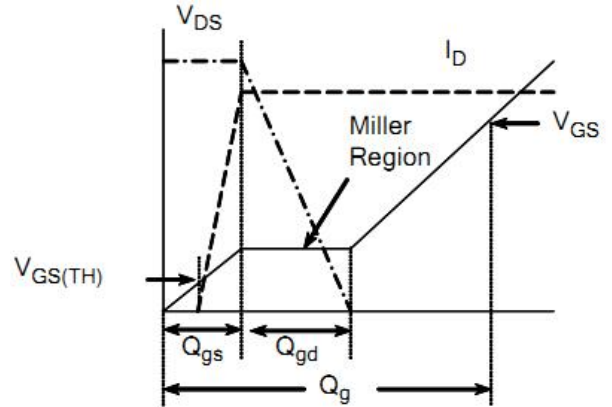


Figure 16. Resistive Switching Test Circuit

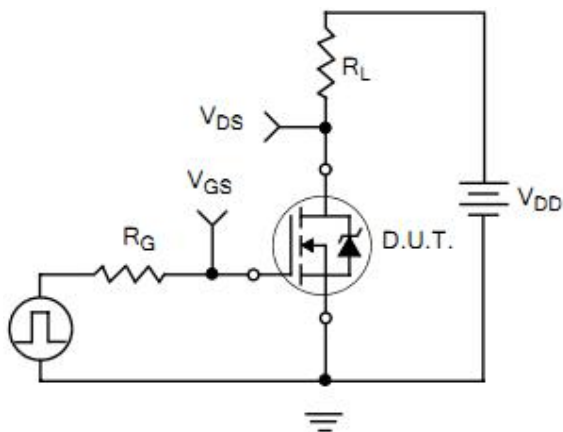


Figure 17. Resistive Switching Waveforms

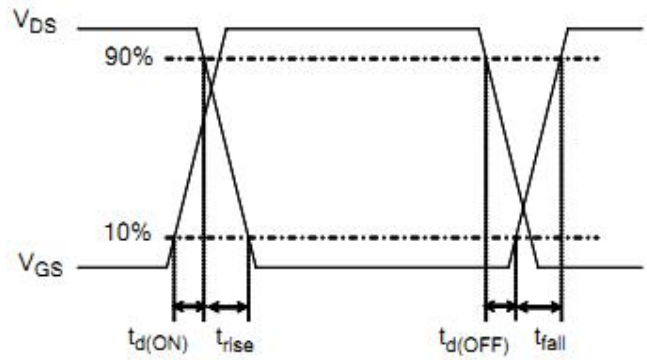


Figure 18. Diode Reverse Recovery Test Circuit

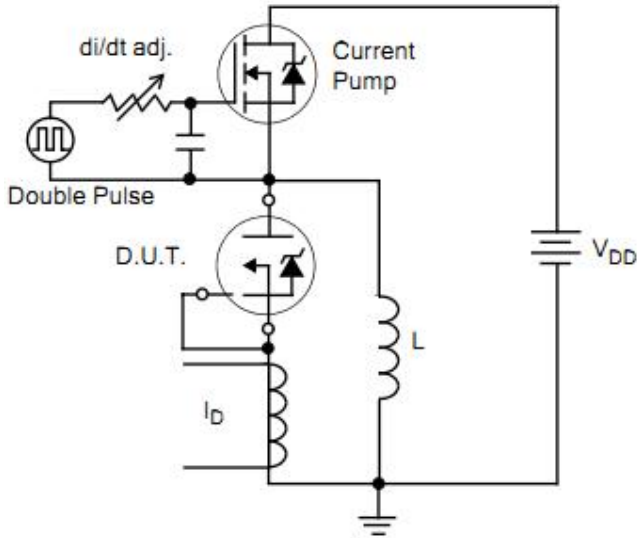


Figure 19. Diode Reverse Recovery Waveform

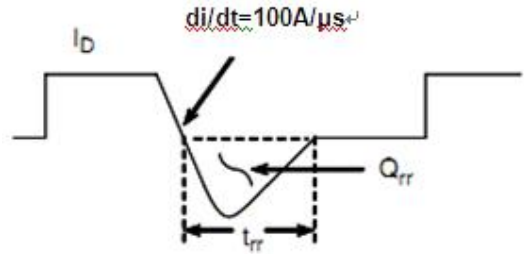


Figure 20. Unclamped Inductive Switching Test Circuit

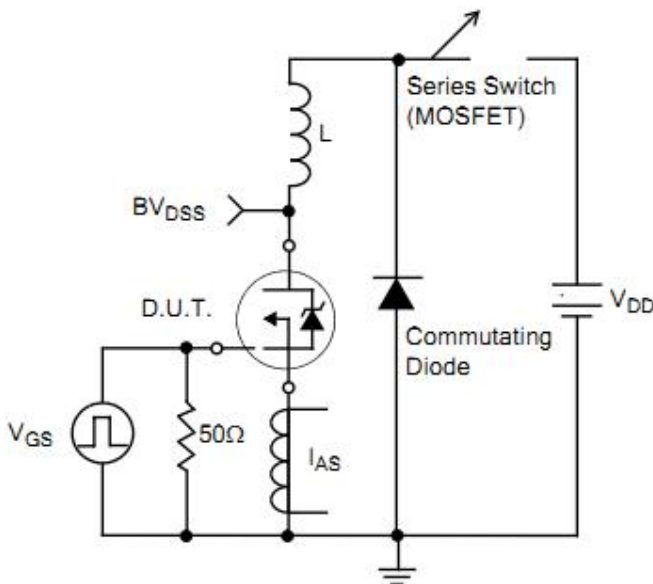
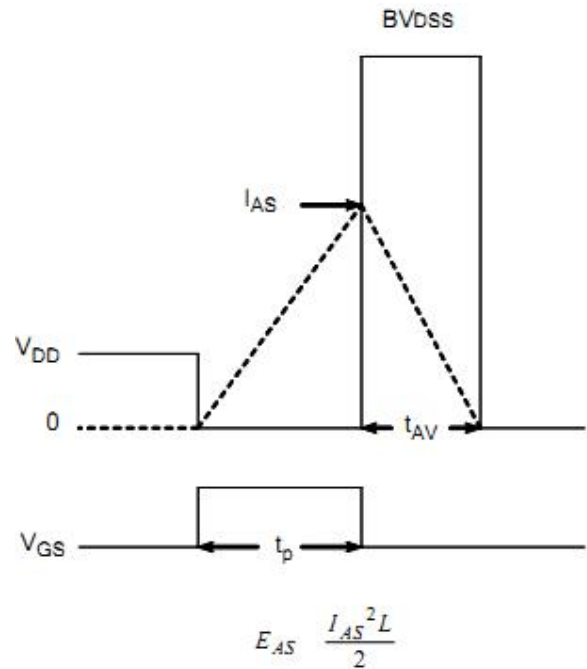


Figure 21. Unclamped Inductive Switching Waveform





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  - b. support or sustain life,
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