



# XTMT10N40F1

## 100V N-Channel MOSFET

### Product Description

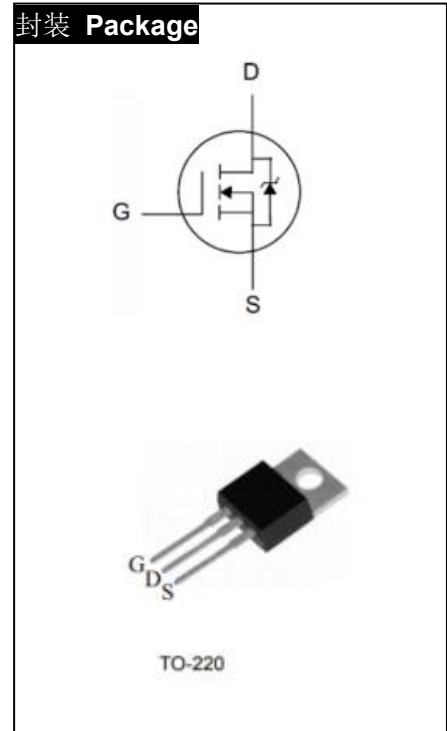
$BV_{DSS}$	100	V
$I_D$	40	A
$R_{DS(ON), Typ.}$	0.013	$\Omega$

### General Features

- Proprietary New Planar Technology
- $R_{DS(ON), typ.} = 13m\Omega @ V_{GS} = 10V$
- Fast Recovery Body Diode
- Low Gate Charge Minimize Switching Loss

### Applications

- Synchronous Rectification
- UPS Inverter



Device	Package	Marking
XTMT10N40F1	TO-220	XTMT10N40F1

### Absolute Maximum Ratings $T_j = 25^\circ\text{C}$

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-to-Source Voltage	100	V
$V_{GSS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D$	Continuous Drain Current	40	A
$I_{DM}$	Pulsed Drain Current at $V_{GS} = 10V$	160	
$T_L$	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	$^\circ\text{C}$
$T_J \& T_{STG}$	Operating and Storage Temperature Range	-55 to 150	

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



## Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.89	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	75	$^{\circ}\text{C}/\text{W}$

## Electrical Characteristics $T_j=25^{\circ}\text{C}$

### OFF Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	100	-	-	V	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$
$I_{DSS}$	Drain-to-Source Leakage Current	-	-	1	uA	$V_{DS}=100\text{V}, V_{GS}=0\text{V}$
		-	-	100		$V_{DS}=80\text{V}, V_{GS}=0\text{V}, T_j=125^{\circ}\text{C}$
$I_{GSS}$	Gate-to-Source Leakage Current	-	-	+100	nA	$V_{GS}=+20\text{V}, V_{DS}=0\text{V}$
		-	-	-100		$V_{GS}=-20\text{V}, V_{DS}=0\text{V}$

### ON Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	-	13	20	m $\Omega$	$V_{GS}=10\text{V}, I_D=50\text{A}$
		-	16	25		$V_{GS}=4.5\text{V}, I_D=50\text{A}$
$V_{GS(TH)}$	Gate Threshold Voltage	1.1	2	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$

**Dynamic Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$C_{iss}$	Input Capacitance	-	1100	-	pF	$V_{GS}=0V$ , $V_{DS}=25V$ , $f=1.0MHz$
$C_{rss}$	Reverse Transfer Capacitance	-	57	-		
$C_{oss}$	Output Capacitance	-	525	-		
$Q_g$	Total Gate Charge	-	23	-	nC	$V_{DD}=50V$ , $I_D=20A$ , $V_{GS}=0$ to 10V
$Q_{gs}$	Gate-to-Source Charge	-	3	-		
$Q_{gd}$	Gate-to-Drain (Miller) Charge	-	7	-		

**Resistive Switching Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$t_{d(ON)}$	Turn-on Delay Time	-	12	-	ns	$V_{DD}=50V$ , $I_D=20A$ , $V_{GS}=10V$ $R_g=3\Omega$
$t_{rise}$	Rise Time	-	5	-		
$t_{d(OFF)}$	Turn-Off Delay Time	-	34	-		
$t_{fall}$	Fall Time	-	7	-		

**Source-Drain Body Diode Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$I_{SD}$	Continuous Source Current <sup>[1]</sup>	-	-	40	A	Integral pn-diode in MOSFET
$I_{SM}$	Pulsed Source Current <sup>[1]</sup>	-	-	160		
$V_{SD}$	Diode Forward Voltage	-	-	1.2	V	$I_S=20A$ , $V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	-	37	-	ns	$I_F=20A$ , $di_F/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	-	35	-	uC	

[1] Pulse width $\leq 380\mu s$ ; duty cycle $\leq 2\%$



Test Circuits and Waveforms

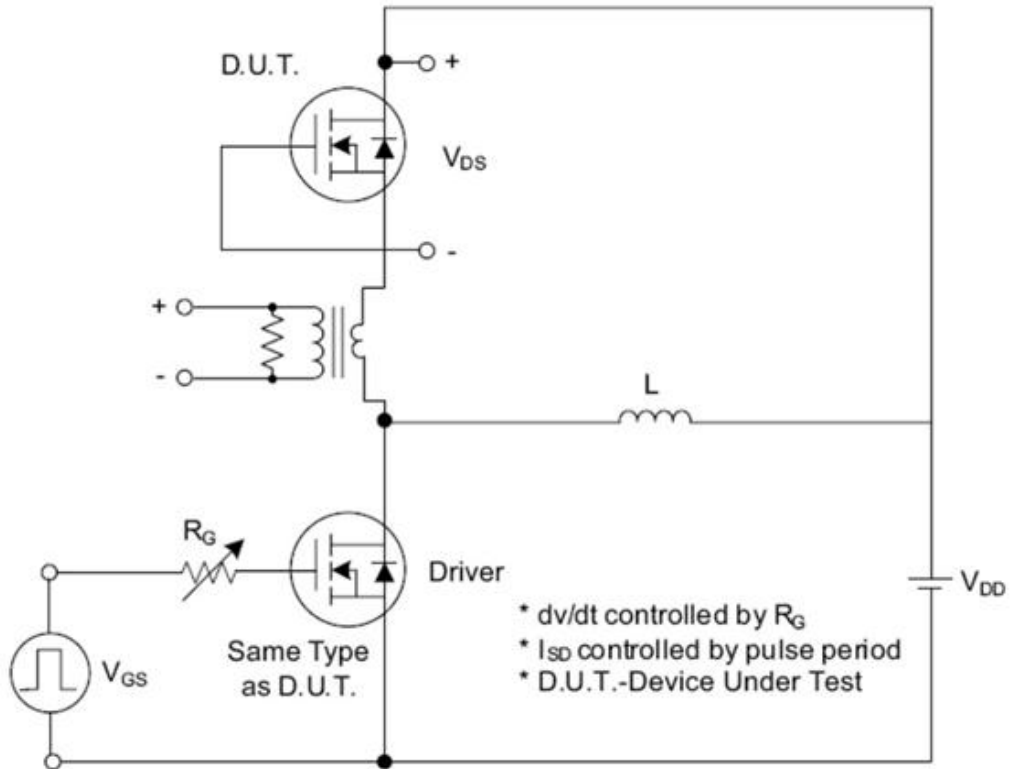


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

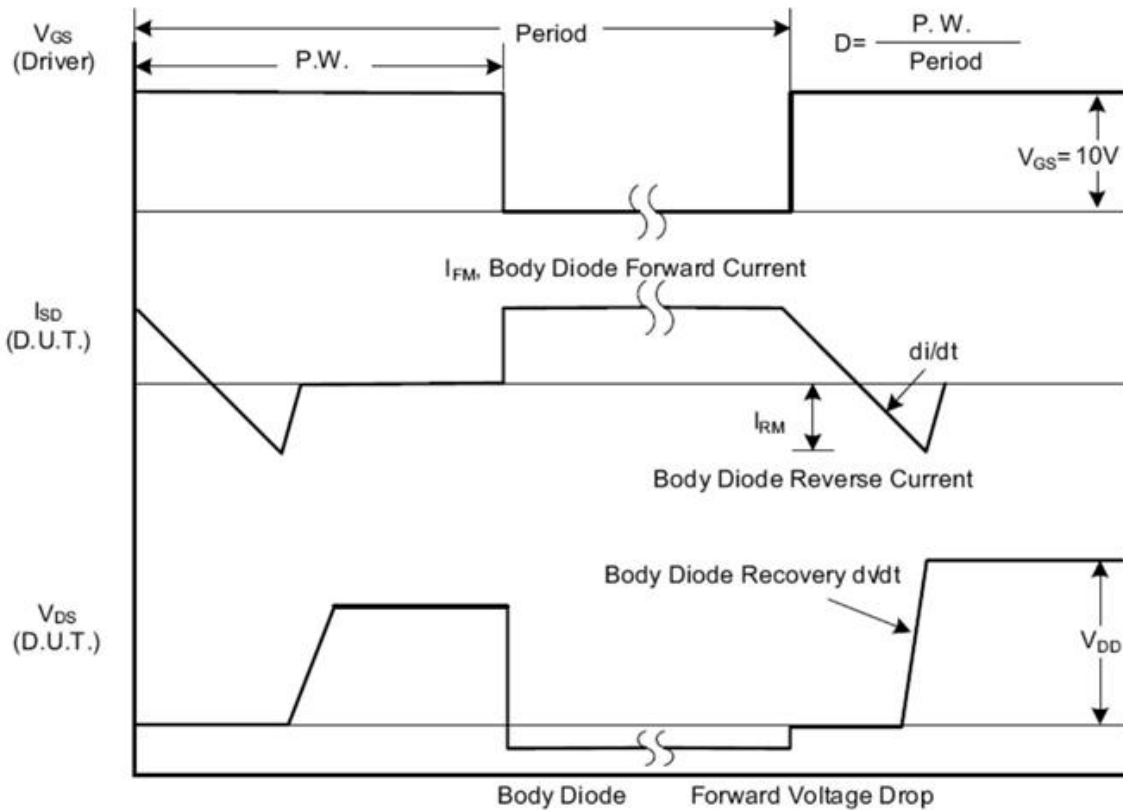


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms



Test Circuits and Waveforms (Cont.)

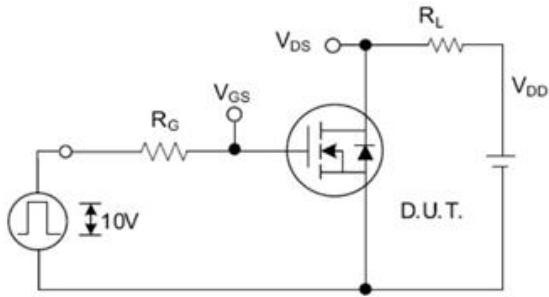


Fig. 2.1 Switching Test Circuit

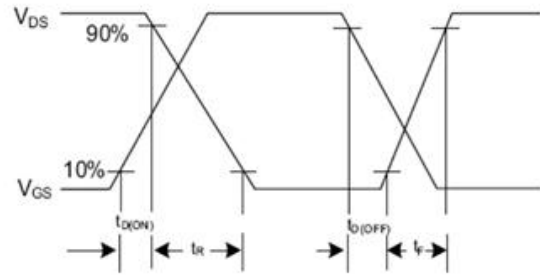


Fig. 2.2 Switching Waveforms

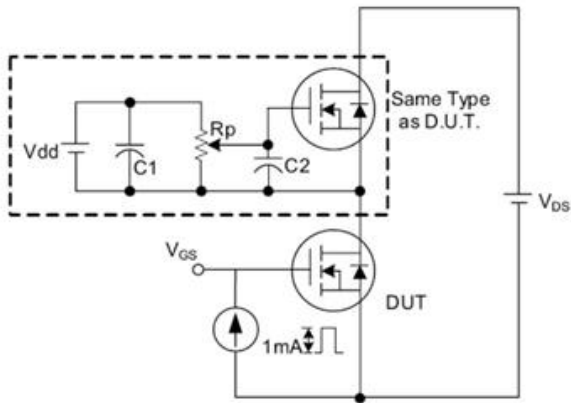


Fig. 3.1 Gate Charge Test Circuit

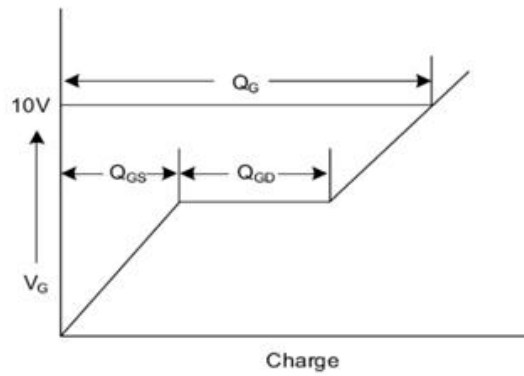


Fig. 3.2 Gate Charge Waveform

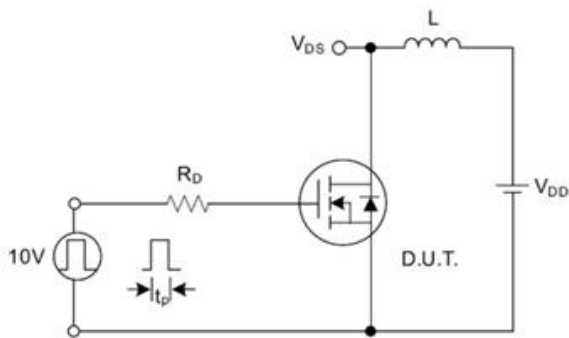


Fig. 4.1 Unclamped Inductive Switching Test Circuit

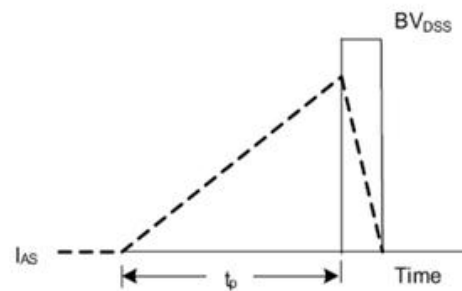


Fig. 4.2 Unclamped Inductive Switching Waveforms