

12N70

Power MOSFET

12A, 700V N-CHANNEL POWER MOSFET

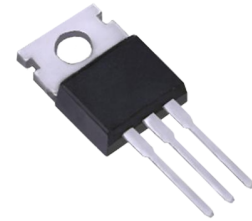
■ DESCRIPTION

The UTC **12N70** are N-Channel enhancement mode power MOSFET which are produced using UTC's proprietary, planar stripe, DMOS technology.

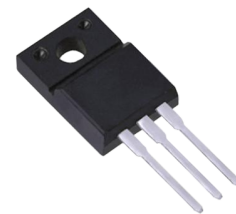
These devices are suited for high efficiency switch mode power supply. To minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode the advanced technology has been especially tailored.

■ FEATURES

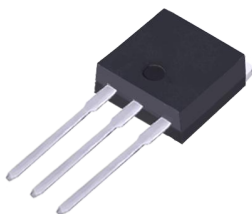
- * $R_{DS(ON)} < 1.0\Omega @ V_{GS} = 10V$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness



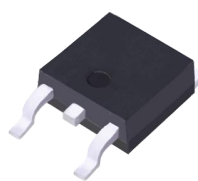
TO-220



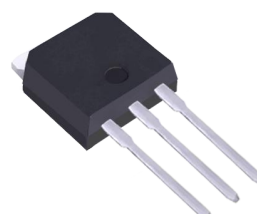
TO-220F



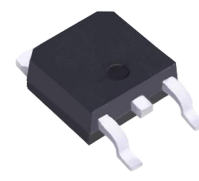
TO-262



TO-263



TO-251



TO-252

■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	12	A
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	48	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	790	mJ
	Repetitive (Note 2)	E_{AR}	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	225	$^\circ\text{C/W}$
	TO-220F/TO-220F1		52	$^\circ\text{C/W}$
	TO-220F3		55	$^\circ\text{C/W}$
	TO-220F2			
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Notes: 1. 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.

2. Repetitive Rating: Pulse width limited by maximum junction temperature

3. $L=10\text{mH}$, $I_{AS}=12\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	TO-220	θ_{JC}	0.56	$^\circ\text{C/W}$
	TO-220F/TO-220F1		2.40	$^\circ\text{C/W}$
	TO-220F3			
	TO-220F2		2.27	$^\circ\text{C/W}$

■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 700\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		0.7		$\text{V}/^\circ\text{C}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$		0.7	1.0	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		1600	1900	pF
Output Capacitance	C_{OSS}			160	270	pF
Reverse Transfer Capacitance	C_{RSS}			25	35	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 30\text{ V}, I_D = 0.5\text{ A},$ $R_G = 25\ \Omega$ (Note 1, 2)		96	120	ns
Turn-On Rise Time	t_R			158	240	ns
Turn-Off Delay Time	$t_{D(OFF)}$			370	400	ns
Turn-Off Fall Time	t_F			180	220	ns
Total Gate Charge	Q_G	$V_{DS} = 50\text{ V}, I_D = 1.3\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 1, 2)		56	60	nC
Gate-Source Charge	Q_{GS}			10		nC
Gate-Drain Charge	Q_{GD}			17		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 12\text{ A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				48	A
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 12\text{ A},$		380		ns
Reverse Recovery Charge	Q_{RR}	$di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 1)		3.5		μC

Notes: 1. Pulse Test: Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TYPICAL CHARACTERISTICS

