



05NK120Z

Preliminary

POWER MOSFET

**0.5A, 1200V N-CHANNEL
POWER MOSFET**

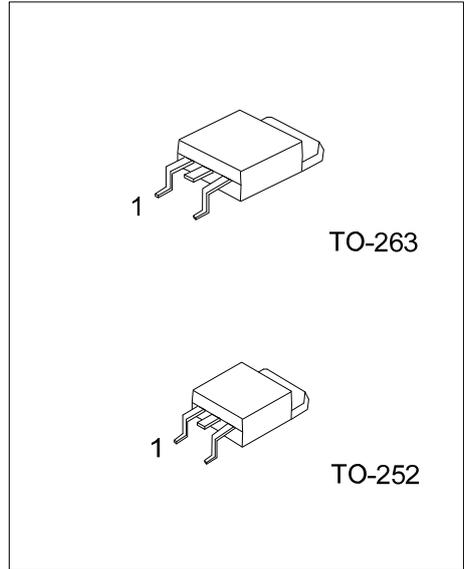
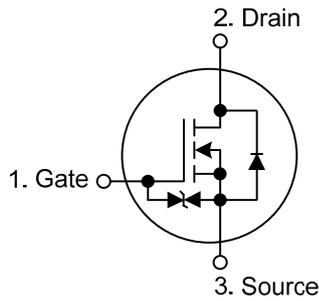
■ DESCRIPTION

The UTC **05NK120Z** is a silicon N-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, high switching speed and low gate charge.

■ FEATURES

- * $R_{DS(ON)} \leq 26 \Omega @ V_{GS}=10V, I_D=0.25A$
- * High switching speed
- * Low input capacitance
- * With ESD protection

■ SYMBOL



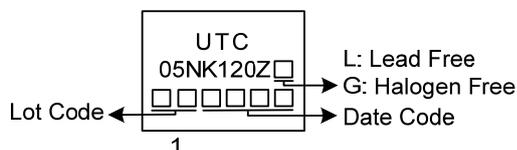
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
05NK120ZL-TN3-R	05NK120ZG-TN3-R	TO-252	G	D	S	Tape Reel
05NK120ZL-TQ2-T	05NK120ZG-TQ2-T	TO-263	G	D	S	Tube
05NK120ZL-TQ2-R	05NK120ZG-TQ2-R	TO-263	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>05NK120ZG-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TN3: TO-252, TQ2: TO-263</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	---

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	1200	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	DC	I_D	0.5	A
	Pulsed (Note 2)	I_{DM}	1	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	12.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.3	V/ns
Power Dissipation	TO-252	P_D	35	W
	TO-263		45	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature Range		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. $L = 100\text{mH}$, $I_{AS} = 0.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD} \leq 0.5\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	$^\circ\text{C}/\text{W}$
	TO-263		62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-252	θ_{JC}	3.57 (Note)	$^\circ\text{C}/\text{W}$
	TO-263		2.77 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

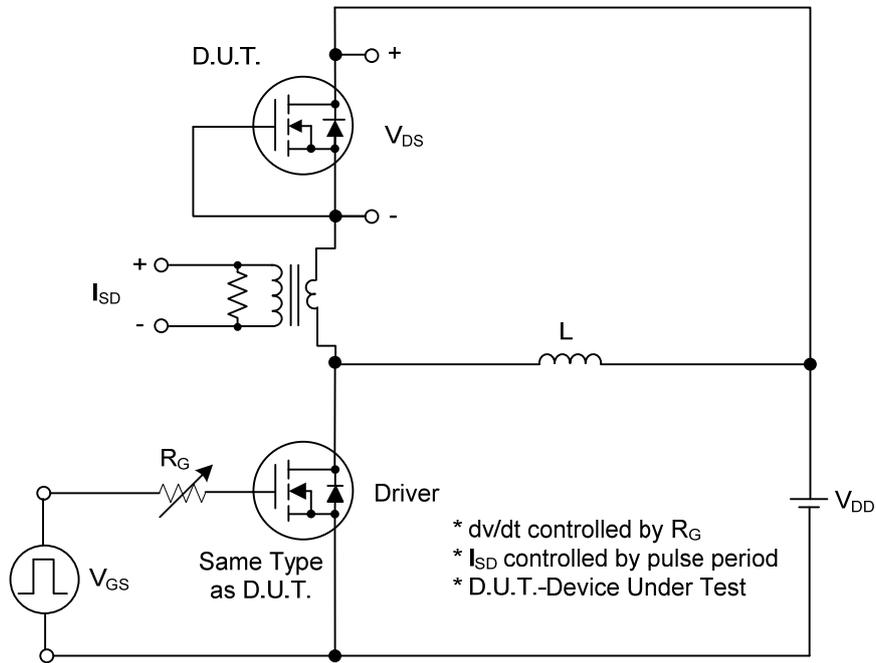
■ ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	1200			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS} V _{GS} =+20V, V _{DS} =0V			+10	μA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-10
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =0.25A		24	26	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		225		pF
Output Capacitance	C _{OSS}			20		pF
Reverse Transfer Capacitance	C _{RSS}			3.2		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =960V, V _{GS} =10V, I _D =0.5A (Note 1, 2)		11.5		nC
Gate to Source Charge	Q _{GS}			5.3		nC
Gate to Drain Charge	Q _{GD}			1.9		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		8		ns
Rise Time	t _r			19		ns
Turn-OFF Delay Time	t _{D(OFF)}			21		ns
Fall-Time	t _f			112		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				0.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				1	A
Diode Forward Voltage	V _{SD}	I _F =0.5A, V _{GS} =0V			1.4	V
Reverse Recovery Time	t _{rr}	I _S =0.5A, V _{GS} =0V, dI _F /dt = 100 A/μs		616		ns
Reverse Recovery Charge (Note 1)	Q _{rr}				1.35	

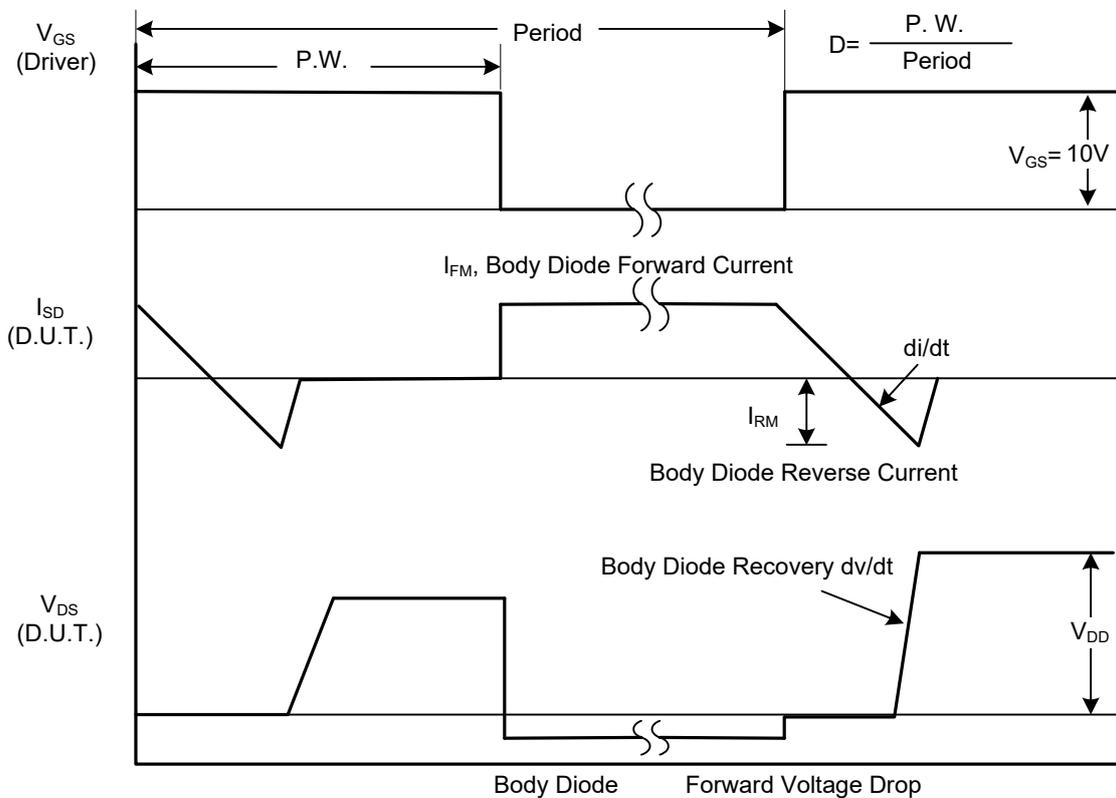
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

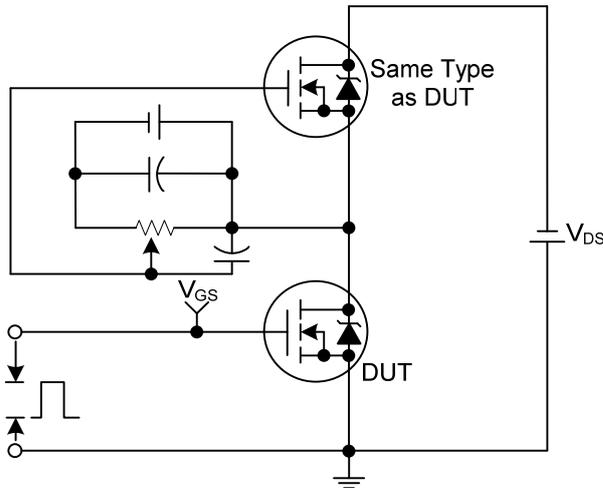


Peak Diode Recovery dv/dt Test Circuit

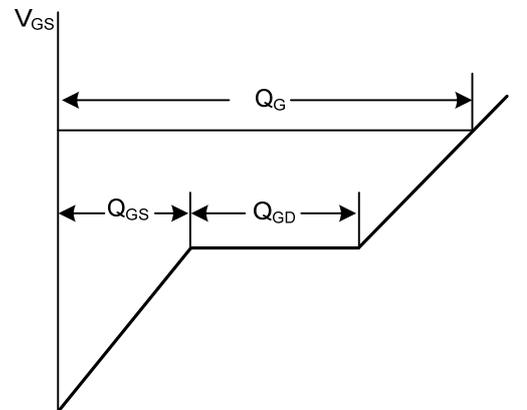


Peak Diode Recovery dv/dt Waveforms

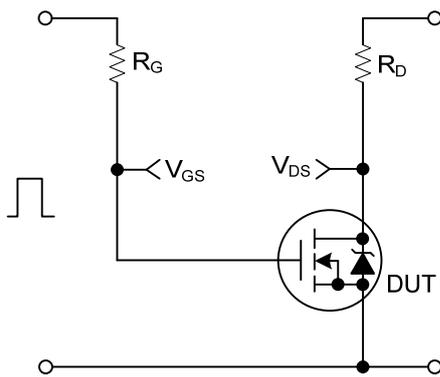
■ TEST CIRCUITS AND WAVEFORMS



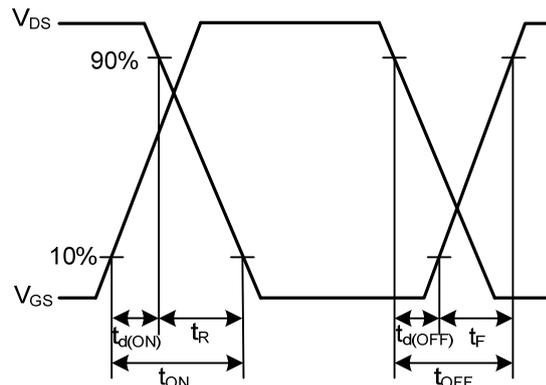
Gate Charge Test Circuit



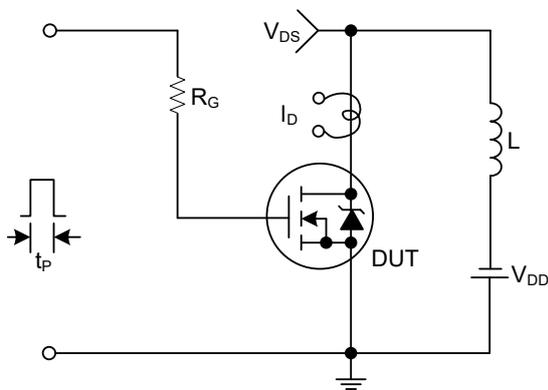
Gate Charge Waveforms



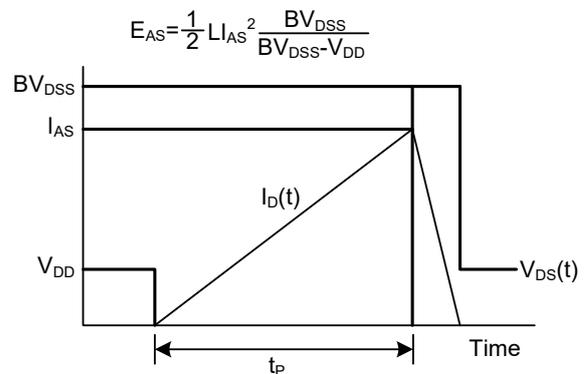
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.