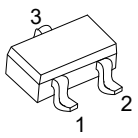
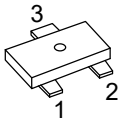
2N7002K

Power MOSFET

300mA, 60V N-CHANNEL ENHANCEMENT MODE MOSFET



SOT-23-3
(JEDEC TO-236)



SOT-723

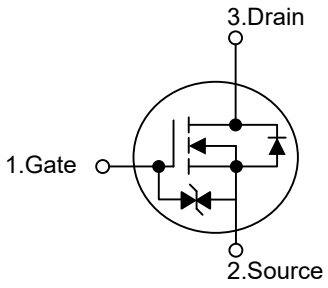
■ DESCRIPTION

The UTC **2N7002K** uses advanced technology to provide excellent $R_{DS(ON)}$, low gate charge and low gate voltages during operation. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

* Low Reverse Transfer Capacitance
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness
* ESD Protected

■ SYMBOL



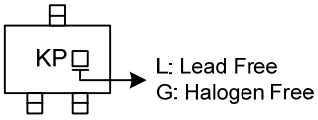
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N7002KL-AE2-R	2N7002KG-AE2-R	SOT-23-3	G	S	D	Tape Reel
2N7002KL-AQ3-R	2N7002KG-AQ3-R	SOT-723	D	S	G	Tape Reel

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

2N7002KG-AE2-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AE2: SOT-23-3, AQ3: SOT-723 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified.)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	300	mA
	Pulse(Note 2)		800	
Power Dissipation	SOT-23-3	P_D	350	mW
	SOT-723		150	mW
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	SOT-23-3	θ_{JA}	357 (Note)	°C/W
	SOT-723		833 (Note)	°C/W

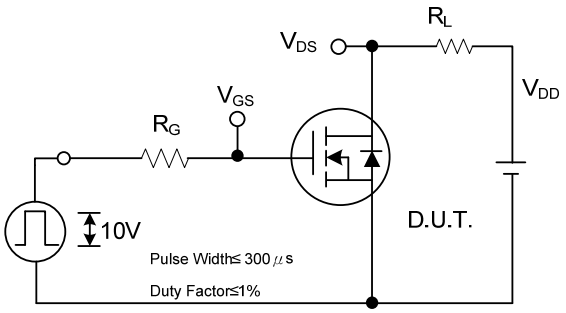
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

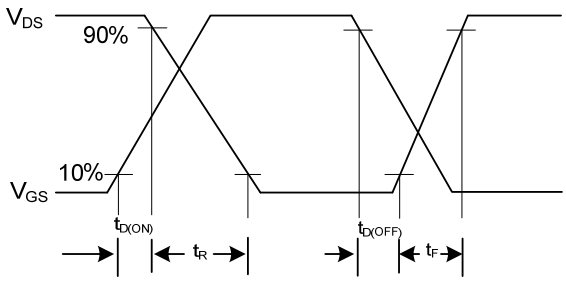
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=10μA	60			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±10	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		2.5	V
Static Drain-Source On-Resistance (Note)	$R_{DS(ON)}$	V_{GS} =10V, I_D=300mA			4.0	Ω
		V_{GS} =4.5V, I_D=50mA			6.0	Ω
DYNAMIC PARAMETERS						
Input Capacitance (Note 1)	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		22		pF
Output Capacitance	C_{OSS}			9		pF
Reverse Transfer Capacitance	C_{RSS}			4		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	I_D=0.2 A, V_{DD}=30V, V_{GS}=10V, R_L=150Ω, R_G=10Ω		1.3		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			4.2		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				300	mA
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				0.8	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=300mA (Note)		0.88	1.5	V

Notes: 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size.
2. Pulse width≦300μs, Duty cycle≦1%

■ TEST CIRCUITS AND WAVEFORMS



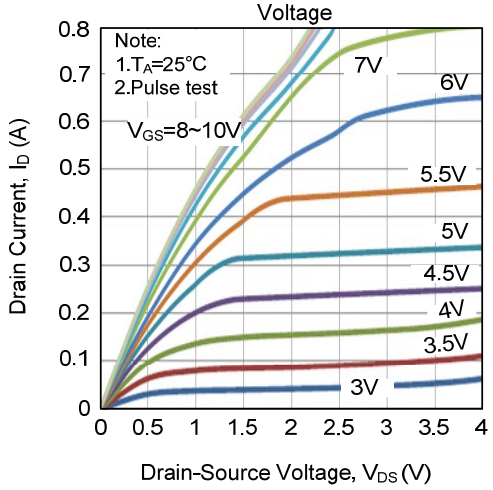
Switching Test Circuit



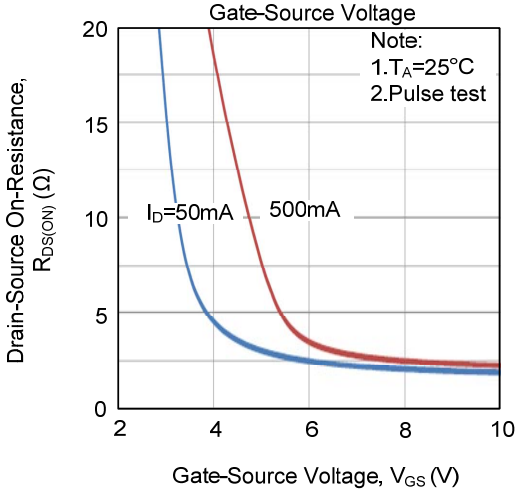
Switching Waveforms

■ TYPICAL CHARACTERISTICS

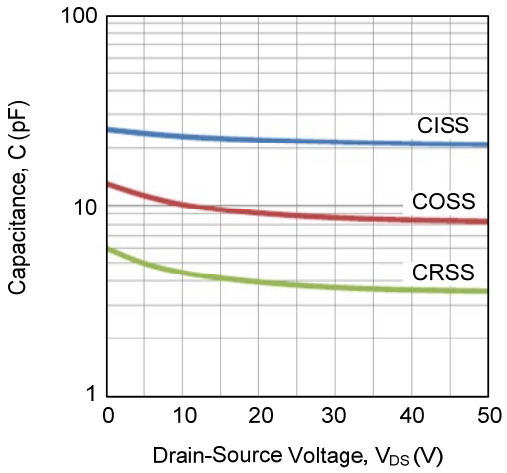
Drain Current vs. Drain-Source Voltage



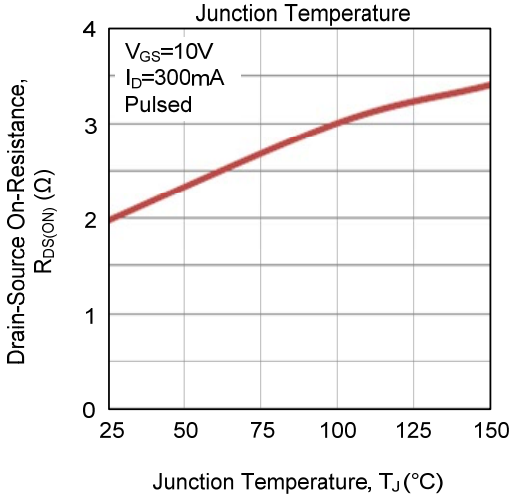
Drain-Source On-Resistance vs. Gate-Source Voltage



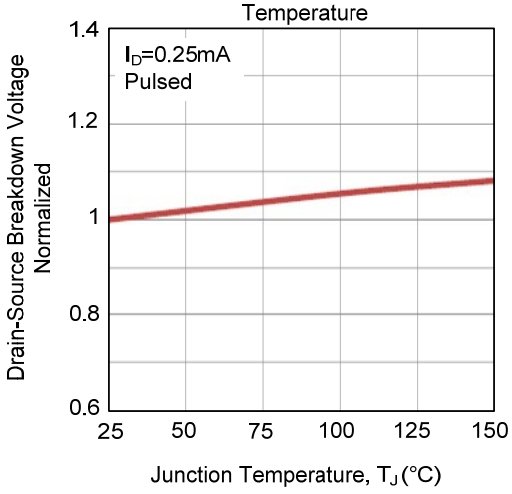
Capacitance Characteristics



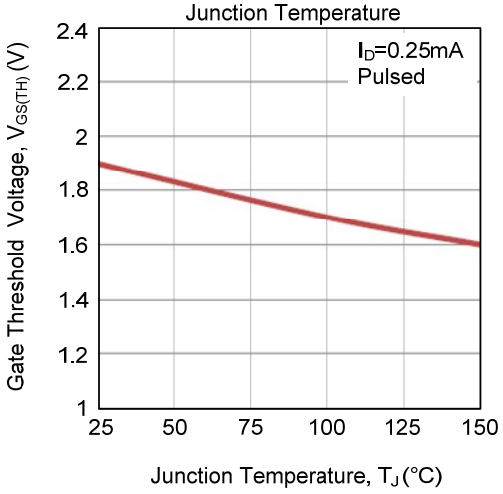
Drain-Source On-Resistance vs. Junction Temperature



Breakdown Voltage vs. Junction Temperature



Gate Threshold Voltage vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)