



USJ60R3K4

Preliminary

Power MOSFET

2.6A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

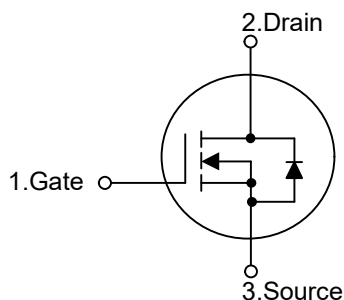
DESCRIPTION

The UTC USJ60R3K4 is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 3.4 \Omega$ @ $V_{GS} = 10V$, $I_D = 0.5A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness
- * Green Product

SYMBOL

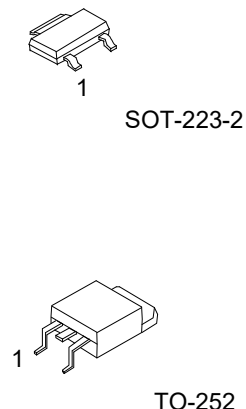


ORDERING INFORMATION

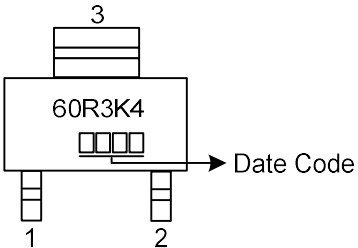
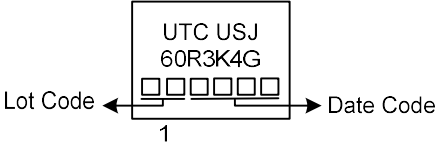
Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
USJ60R3K4G-AA2-R	SOT-223-2	G	D	S	Tape Reel
USJ60R3K4G-TN3-R	TO-252	G	D	S	Tape Reel

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

USJ60R3K4G-AA2-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AA2: SOT-223-2, TN3: TO-252 (3) G: Halogen Free and Lead Free
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■ MARKING

SOT-223-2	TO-252
 Diagram of SOT-223-2 marking. The package is a small rectangle with three leads. Lead 1 is on the left, lead 2 is on the right, and lead 3 is on the top. The marking '60R3K4' is printed on the top surface. Below it, there are four small squares representing a date code. An arrow points from these squares to the text 'Date Code'.	 Diagram of TO-252 marking. The package is a larger rectangle. The marking 'UTC USJ' is printed on the top surface, followed by '60R3K4G'. Below this, there are four small squares representing a date code. An arrow points from these squares to the text 'Date Code'. To the left of the package, there is a label 'Lot Code' with an arrow pointing to the package.

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous (Note 2)	I_D	2.6	A
	Pulsed (Note 3)	I_{DM}	3.9	A
Avalanche Energy	Single Pulsed (Note 4)	E_{AS}	25	mJ
Peak Diode Recovery dv/dt (Note 5)		dv/dt	5	V/ns
Power Dissipation	SOT-223-2	P_D	4	W
	TO-252		20	W
Junction Temperature		T_J	+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. Duty cycle $D=0.5$, limited by maximum junction temperature.

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

3. $L = 100\text{mH}$, $I_{AS} = 0.7\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD} \leq 2.6\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223-2	θ_{JA}	150	$^\circ\text{C/W}$
	TO-252		110	$^\circ\text{C/W}$
Junction to Case	SOT-223-2	θ_{JC}	31.25 (Note)	$^\circ\text{C/W}$
	TO-252		6.25 (Note)	$^\circ\text{C/W}$

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

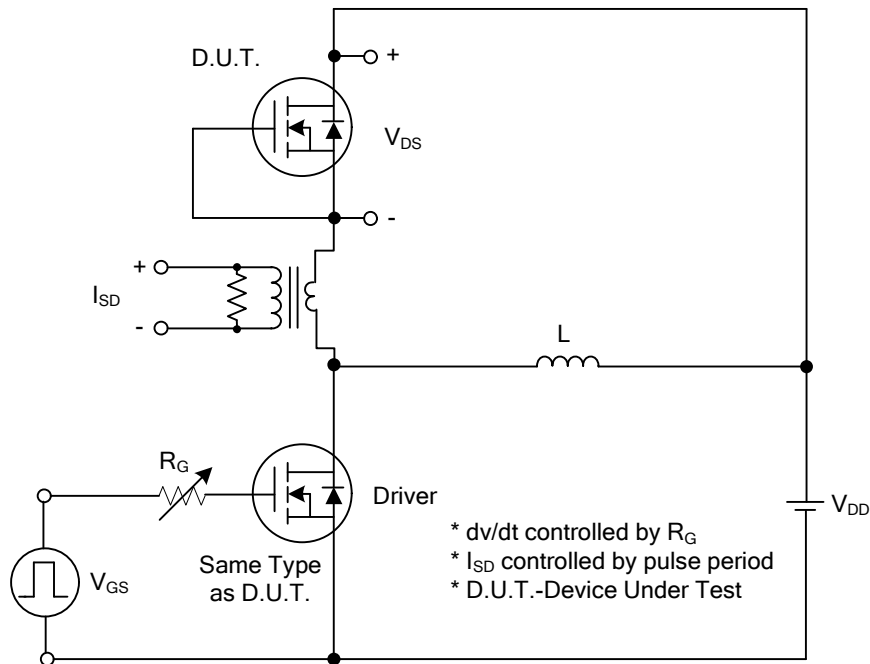
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			100	nA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V ,V _{GS} =20V			100	nA
	Reverse		V _{DS} =0V ,V _{GS} =-20V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =0.5A			3.4	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		81		pF
Output Capacitance		C _{OSS}			40		pF
Reverse Transfer Capacitance		C _{RSS}			5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =480V, V _{GS} =10V, I _D =2.6A (Note 1, 2)		10		nC
Gate to Source Charge		Q _{GS}			5		nC
Gate to Drain Charge		Q _{GD}			3		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =2.6A, R _G =25Ω (Note 1, 2)		4		ns
Rise Time		t _R			18		ns
Turn-OFF Delay Time		t _{D(OFF)}			17		ns
Fall-Time		t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				2.6	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =2.6A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time(Note 1)		t _{rr}	I _S =2.6A, V _{GS} =0V,		218		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs		1.1		μC

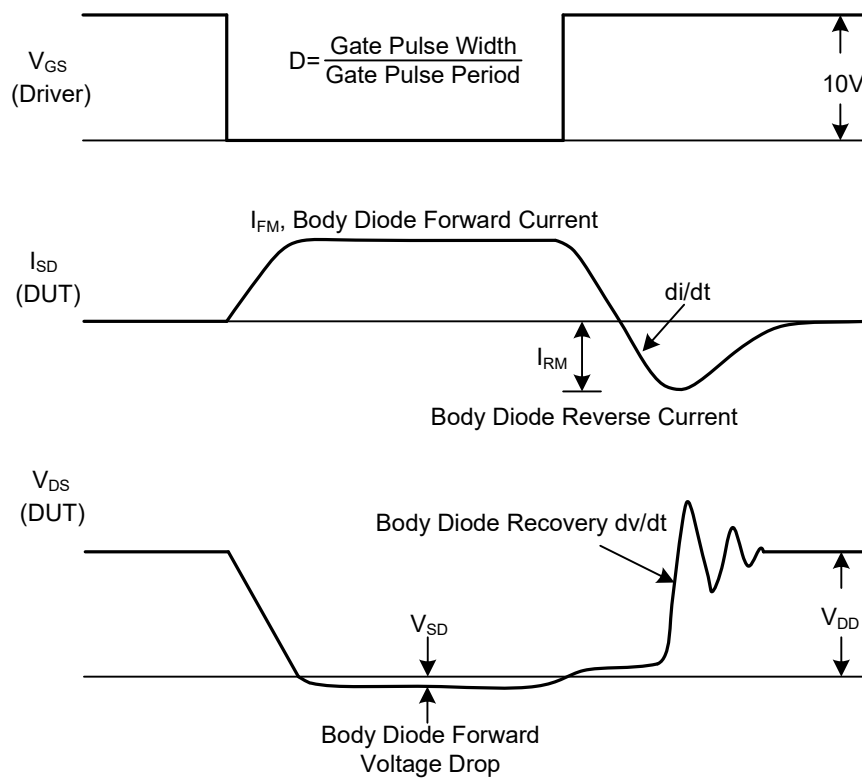
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

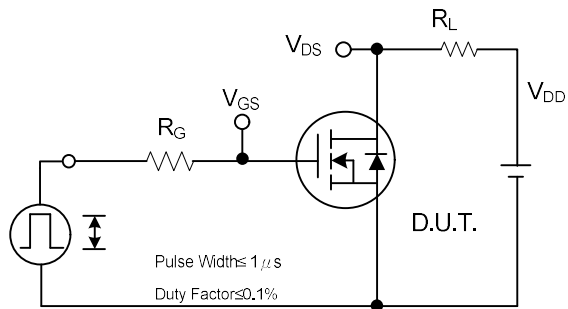


Peak Diode Recovery dv/dt Test Circuit

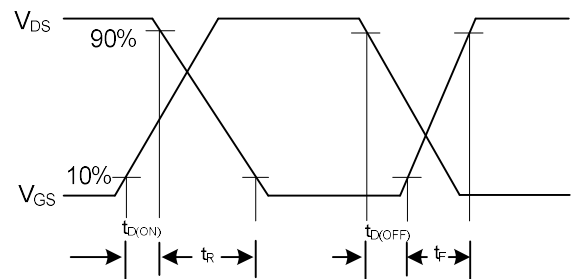


Peak Diode Recovery dv/dt Waveforms

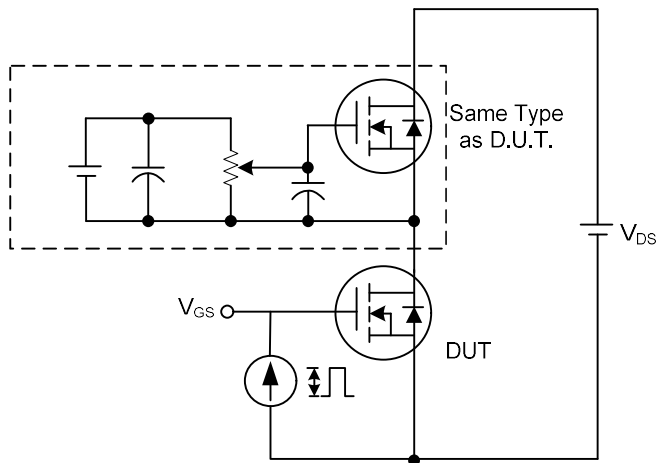
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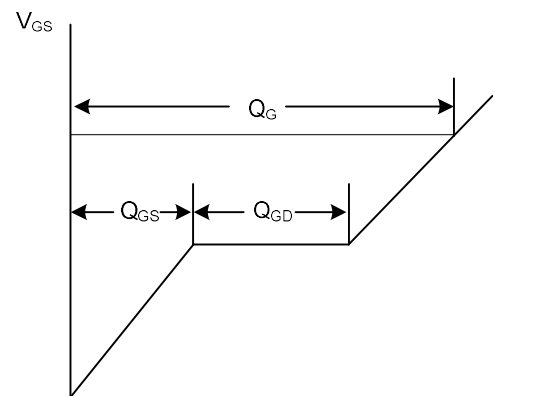
Switching Test Circuit



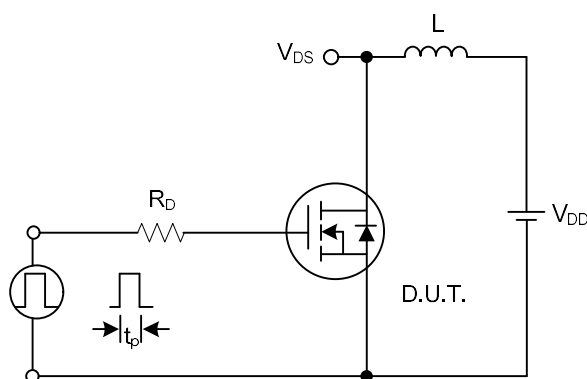
Switching Waveforms



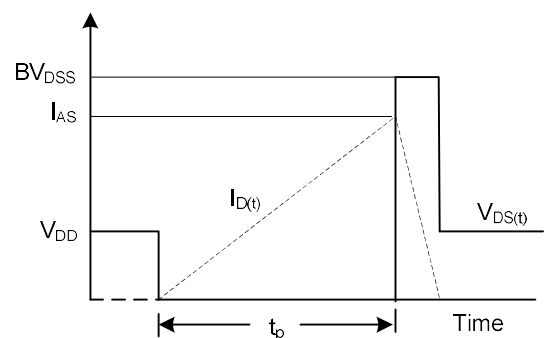
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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