

UTC UNISONIC TECHNOLOGIES CO., LTD

USJ60R380Z

Preliminary

Power MOSFET

13A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

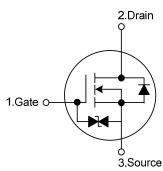
DESCRIPTION

The UTC USJ60R380Z 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

- * $R_{DS(ON)} \le 0.38 \Omega$ @ $V_{GS}=10V$, $I_{D}=3.8A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness
- * With ESD protection

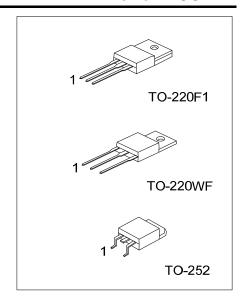




ORDERING INFORMATION

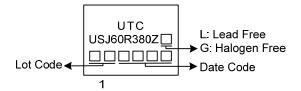
Ordering Number		Daakaaa	Pin Assignment			Da akin n	
Lead Free	Halogen Free	Package	1	2	3	Packing	
USJ60R380ZL-TF1-T	USJ60R380ZG-TF1-T	TO-220F1	G	D	S	Tube	
USJ60R380ZL-TW1-T	USJ60R380ZG-TW1-T	TO-220WF	G	D	S	Tube	
USJ60R380ZL-TN3-R	USJ60R380ZG-TN3-R	TO-252	G	D	S	Tape Reel	

Note: Pin Assignment: G: Gate D: Drain USJ60R380ZG-TF1-T (1)Packing Type (1) T: Tube, R: Tape Reel (2)Package Type (2) TF1: TO-220F1, TW1: TO-220WF, TN3: TO-252 (3)Green Package (3) G: Halogen Free and Lead Free, L: Lead Free



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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V _{DSS}	600	V	
Gate-Source Voltage		V _{GSS}	±20	V	
Drain Current	Continuous	I _D	13	A	
	Pulsed (Note 2)	I _{DM}	39	Α	
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	12.5	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.3	V/ns	
Power Dissipation	TO-220F1/TO-220WF	-	28	W	
	TO-252	P_D	58	W	
Junction Temperature		TJ	+150	°C	
Storage Temperature		T _{STG}	-55 ~ +150	°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 = 100mH, I_{AS} = 0.5A, V_{DD} = 50V, R_{G} = 25 Ω Starting T_{J} = 25°C
- 4. $I_{SD} \leq 13A$, di/dt $\leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL RATINGS		UNIT
Junction to Ambient	TO-220F1/TO-220WF	0	62.5	°C/W
	TO-252	θја	110	°C/W
Junction to Case	TO-220F1/TO-220WF	0	4.46	°C/W
	TO-252	θις	2.15 (Note)	°C/W

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

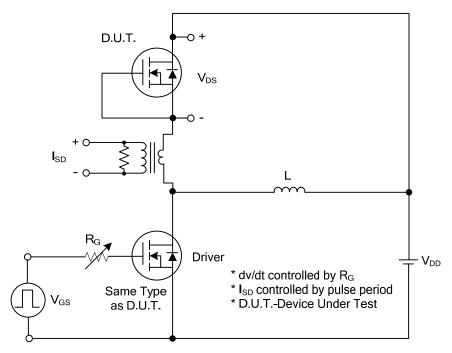
■ ELECTRICAL CHARACTERISTICS (T」=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_DSS	V_{GS} =0V, I_D =250 μ A	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μΑ
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V ,V _{GS} =20V			10	μΑ
	Reverse		V _{DS} =0V ,V _{GS} =-20V			-10	μΑ
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 =3.8A			0.38	Ω
DYNAMIC PARAMETERS		_				-	
Input Capacitance		C _{ISS}			846		рF
Output Capacitance		Coss	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		143		рF
Reverse Transfer Capacitance		C _{RSS}			6		pF
SWITCHING PARAMETERS							-
Total Gate Charge (Note 1)		Q_{G}	V _{DS} =480V, V _{GS} =10V, I _D =1A (Note 1, 2)		33		Nc
Gate to Source Charge		Q_GS			6		nC
Gate to Drain Charge		Q_{GD}	(Note 1, 2)		10		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	1001/11/101/		9		ns
Rise Time		t_{R}	V _{DD} =100V, V _{GS} =10V,		22		ns
Turn-OFF Delay Time		t _{D(OFF)}	I _D =3.25A, R _G =25Ω (Note 1, 2)		91		ns
Fall-Time		t_{F}	2)		37		ns
SOURCE- DRAIN DIODE RATING	S AND CH	ARACTERIS	TICS				
Maximum Continuous Drain-Source	e Diode					13	Α
Forward Current		Is				13	^
Drain-Source Diode Forward Voltage		V _{SD}	I _S =13A, V _{GS} =0V			1.4	V
(Note 1)			15-15A, VGS-UV			1.4	V
Body Diode Reverse Recovery Time		trr	Is=13A, V _{GS} =0V,		268		ns
(Note 1)		ч	dl _F /dt=100A/µs				113
Body Diode Reverse Recovery Charge		Qrr			2711		nC

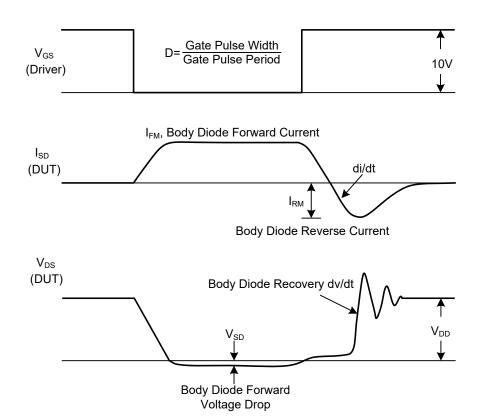
Notes: 1. Pulse Test: Pulse width \leq 300 μ s, Duty cycle \leq 2%.

^{2.} Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

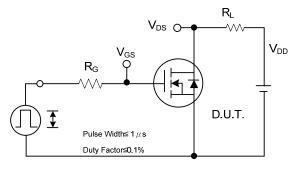


Peak Diode Recovery dv/dt Test Circuit

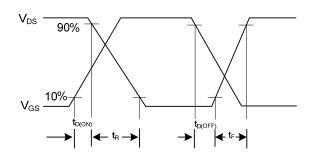


Peak Diode Recovery dv/dt Waveforms

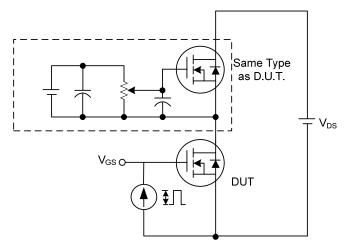
■ TEST CIRCUITS AND WAVEFORMS



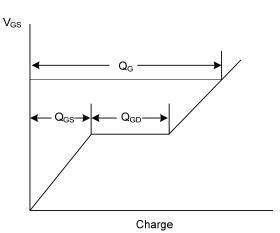
Switching Test Circuit



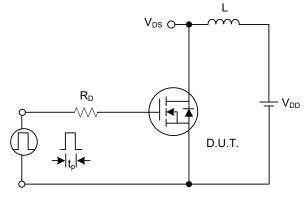
Switching Waveforms



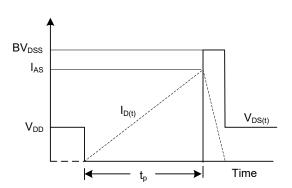
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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