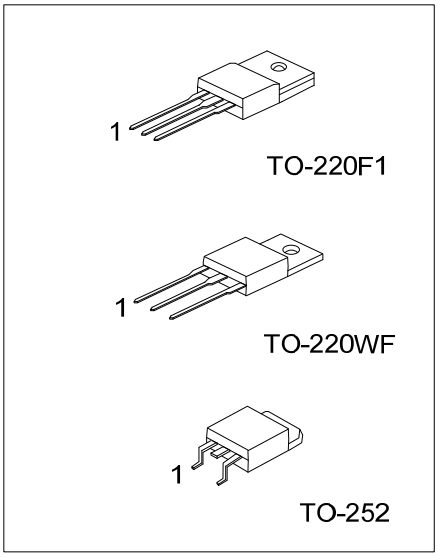
USJ60R280Z **Preliminary** ***Power MOSFET***

18A, 600V N-CHANNEL SUPER-JUNCTION MOSFET



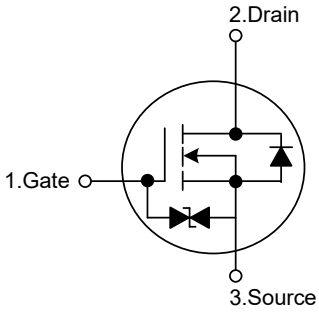
■ DESCRIPTION

The **UTC USJ60R280Z** 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

* $R_{DS(ON)} \leq 0.28\ \Omega$ @ V_{GS}=10V, I_D=6.5A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness
* With ESD protection

■ SYMBOL



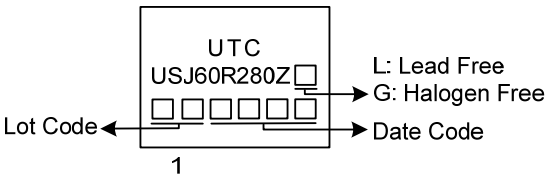
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USJ60R280ZL-TF1-T	USJ60R280ZG-TF1-T	TO-220F1	G	D	S	Tube
USJ60R280ZL-TW1-T	USJ60R280ZG-TW1-T	TO-220WF	G	D	S	Tube
USJ60R280ZL-TN3-R	USJ60R280ZG-TN3-R	TO-252	G	D	S	Tape Reel

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

USJ60R280ZG-TF1-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TW1: TO-220WF, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING


UTC
USJ60R280Z
L: Lead Free
G: Halogen Free
Lot Code
Date Code
1

■ 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	18	A
	Pulsed (Note 2)	I_{DM}	54	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	156	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.4	V/ns
Power Dissipation	TO-220F1/TO-220WF	P_D	30	W
	TO-252		60	W
Junction Temperature		T_J	+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} = 1.8A, V_{DD} = 50V, R_G = 25Ω Starting T_J = 25°C
4. I_{SD} ≤ 18A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220WF	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220F1/TO-220WF	θ_{JC}	4.16	°C/W
	TO-252		2.08 (Note)	°C/W

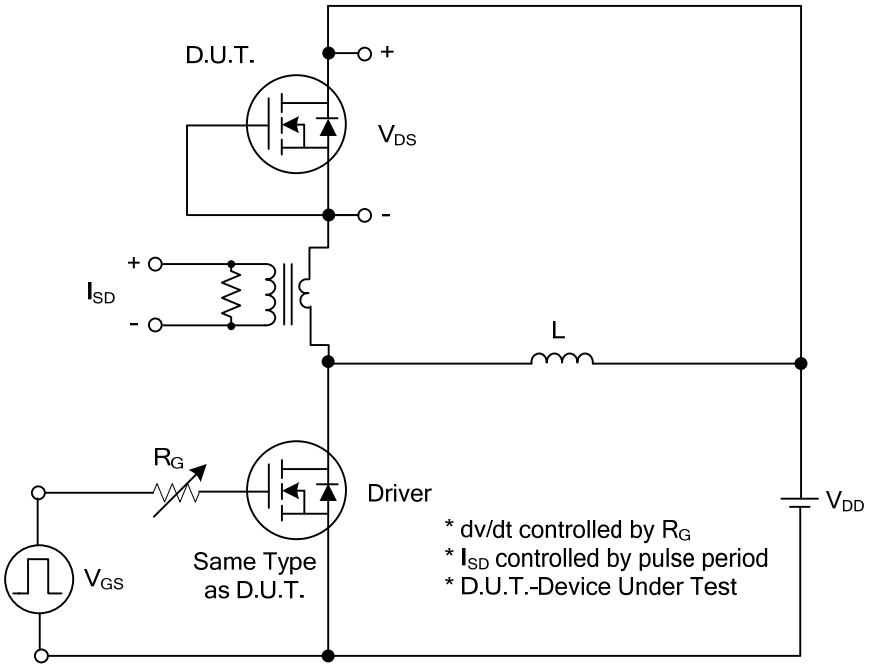
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

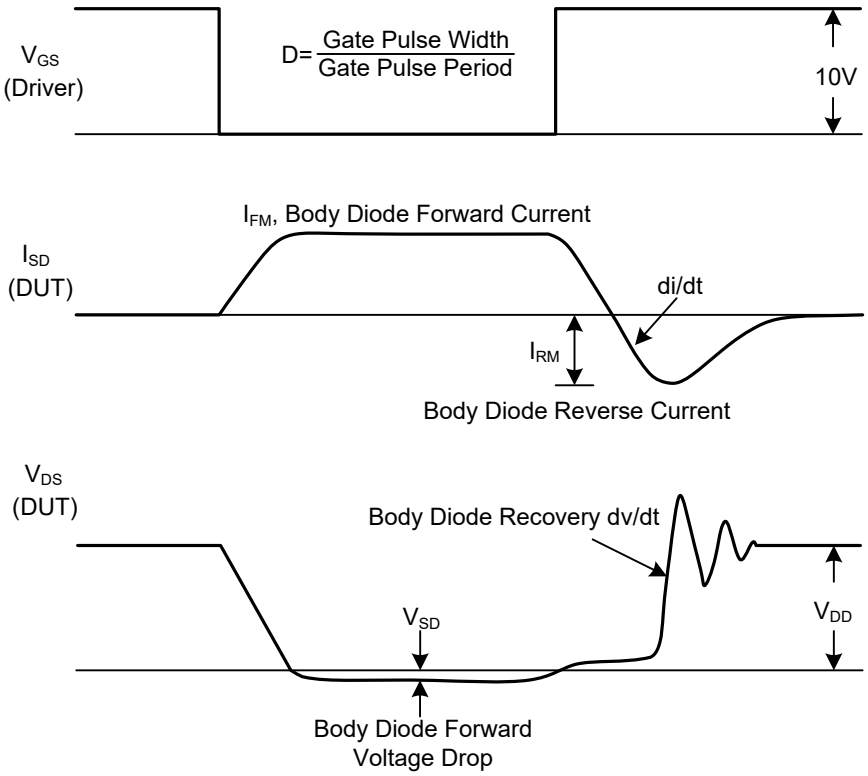
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±10	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6.5A			0.28	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1MHz		1055		pF
Output Capacitance	C_{OSS}			157		pF
Reverse Transfer Capacitance	C_{RSS}			4		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=480V, V_{GS}=10V, I_D=1.0A (Note 1, 2)		36		nC
Gate-Source Charge	Q_{GS}			7		nC
Gate-Drain Charge	Q_{DD}			10		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=9.0A, R_G =25Ω (Note 1, 2)		13		ns
Turn-On Rise Time	t_R			23		ns
Turn-Off Delay Time	$t_{D(OFF)}$			96		ns
Turn-Off Fall Time	t_F			54		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				18	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S=18A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S=18A, V_{GS}=0V, dI_F/dt=100A/μs		316		nS
Body Diode Reverse Recovery Charge	Q_{rr}			3572		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

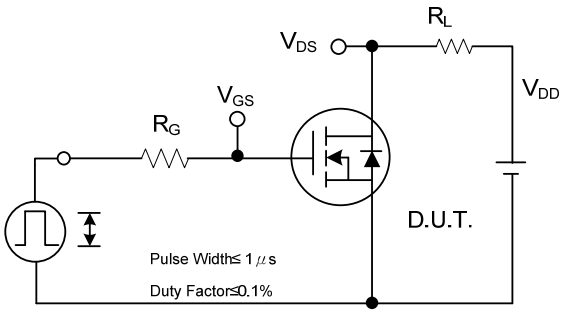


Peak Diode Recovery dv/dt Test Circuit

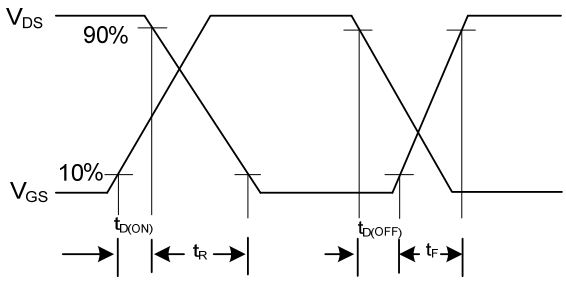


Peak Diode Recovery dv/dt Waveforms

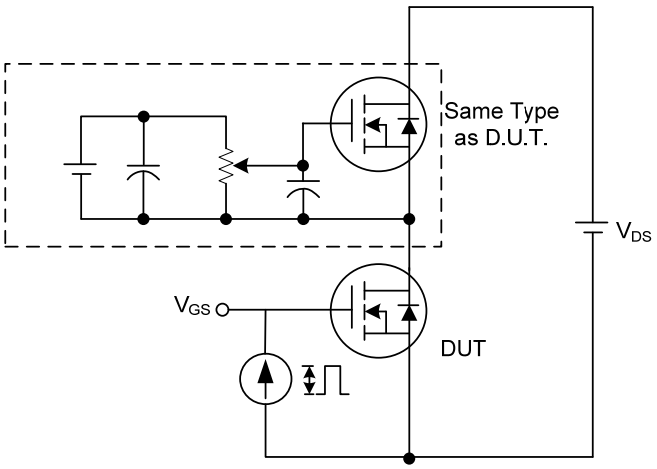
■ TEST CIRCUITS AND WAVEFORMS



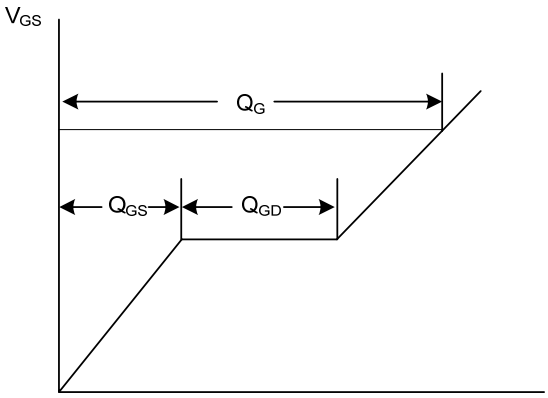
Switching Test Circuit



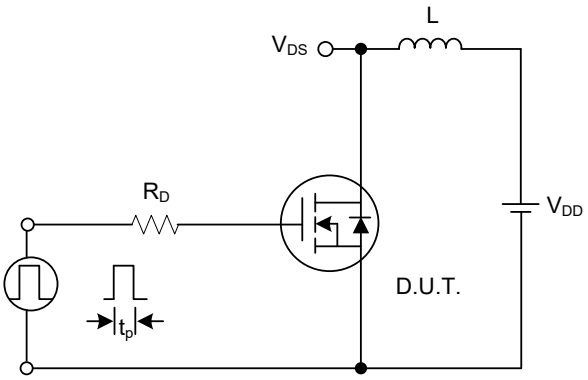
Switching Waveforms



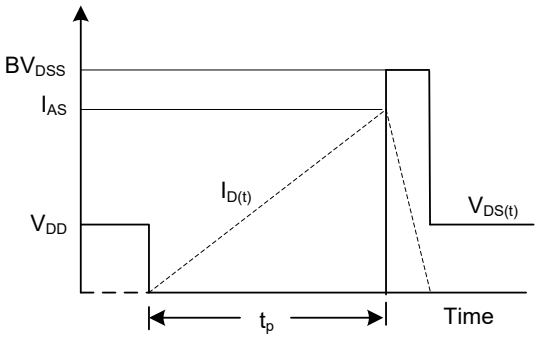
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms