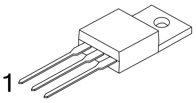
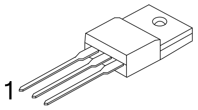
UTC **UNISONIC TECHNOLOGIES CO., LTD**

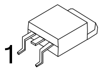
7.0A, 800V N-CHANNEL SUPER-JUNCTION MOSFET



TO-220



TO-220F1



TO-252

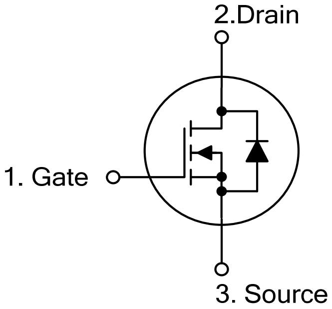
DESCRIPTION

The **UTC 7NM80** 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 DC-DC, AC-DC converters for power applications.

FEATURES

* $R_{DS(ON)} < 0.94\Omega$ @ V_{GS} = 10V, I_D = 3.5A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness

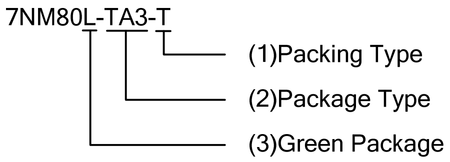
SYMBOL



ORDERING INFORMATION

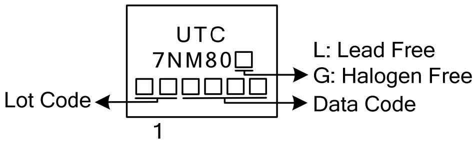
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7NM80L-TA3-T	7NM80G-TA3-T	TO-220	G	D	S	Tube
7NM80L-TF1-T	7NM80G-TF1-T	TO-220F1	G	D	S	Tube
7NM80L-TN3-T	7NM80G-TN3-T	TO-252	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TN3: TO-252
(3) L: Lead Free, G: Halogen Free and Lead Free

MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	800	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	7.0	A
	Pulsed (Note 2)	I_{DM}	28	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	420	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	6.2	V/ns
Power Dissipation	TO-220	P_D	142	W
	TO-220F1		52	W
	TO-252		83	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		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=159mH, I_{AS}=2.3A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C.
4. I_{SD} ≤7.0A, di/dt ≤200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220	θ_{JC}	0.88	°C/W
	TO-220F1		2.4	°C/W
	TO-252		1.5	°C/W

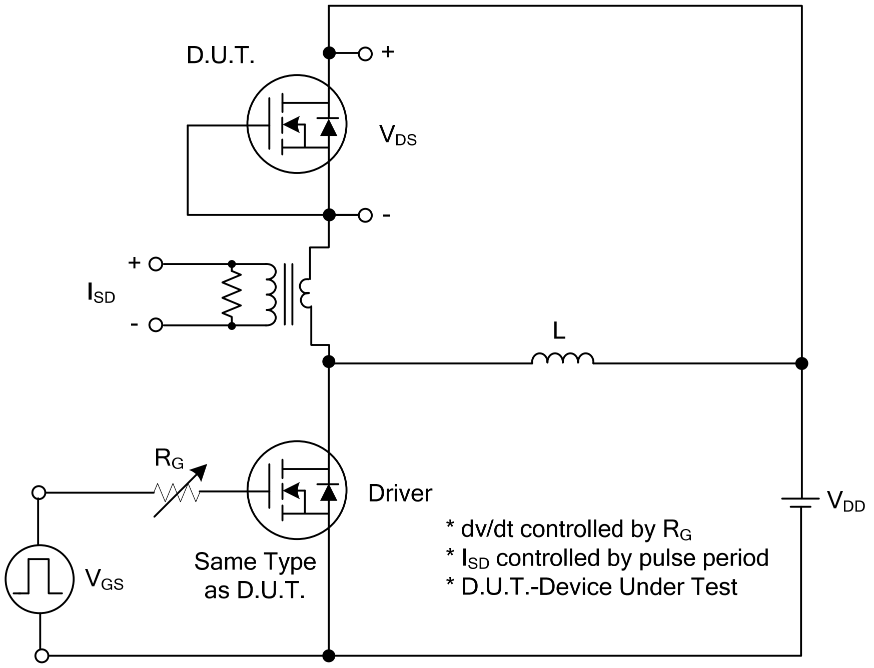
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	800			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=800V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V ,V_{GS}=±30V			±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 = 3.5A			0.94	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		620		pF
Output Capacitance	C_{OSS}			244		pF
Reverse Transfer Capacitance	C_{RSS}			18		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A , I_G=100μA (Note 1, 2)		46		nC
Gate to Source Charge	Q_{GS}			5		nC
Gate to Drain Charge	Q_{GD}			16		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		56		ns
Rise Time	t_R			120		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			272		ns
Fall-Time	t_F			68		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				7.0	A
Maximum Body-Diode Pulsed Current	I_{SM}				28	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S =3.5A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S =7.0A, V_{GS}=0V, dI_F/dt=100A/μs		450		ns
Body Diode Reverse Recovery Charge	Q_{rr}			6		μC

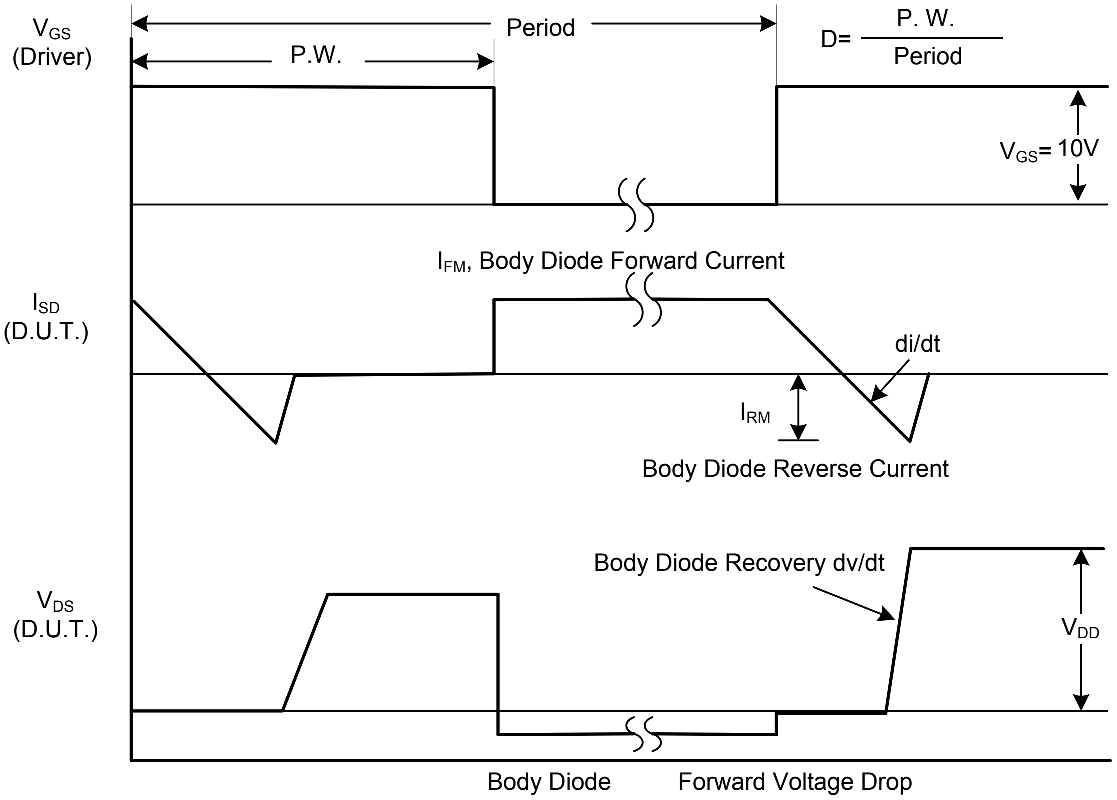
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

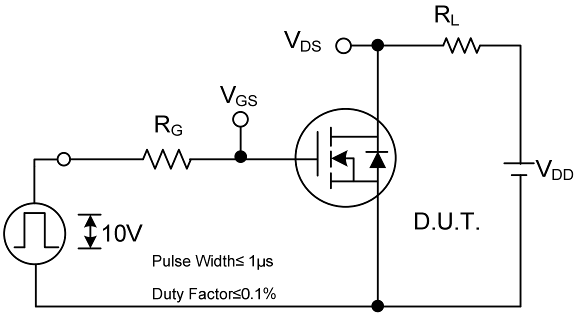


Peak Diode Recovery dv/dt Test Circuit

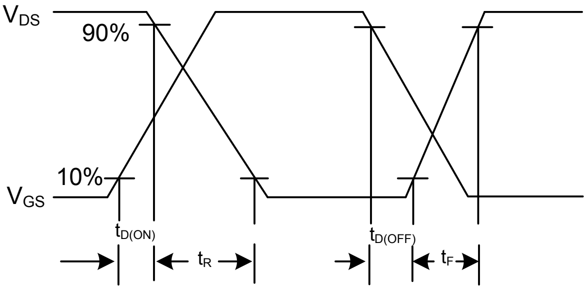


Peak Diode Recovery dv/dt Waveforms

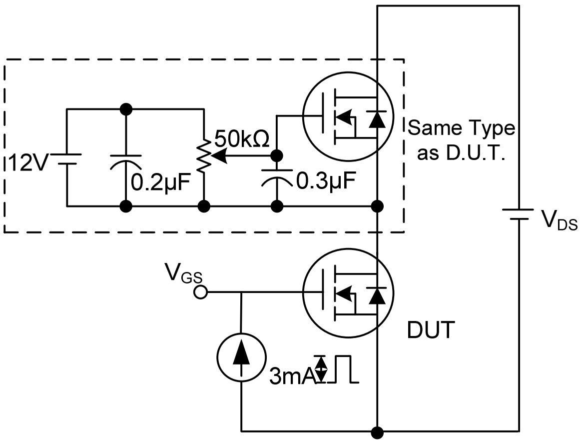
- TEST CIRCUITS AND WAVEFORMS (Cont.)



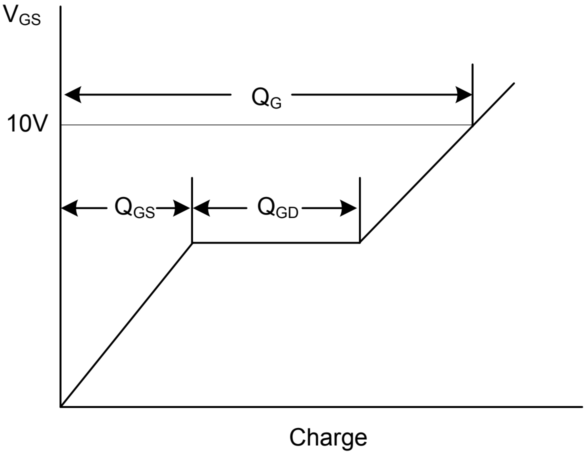
Switching Test Circuit



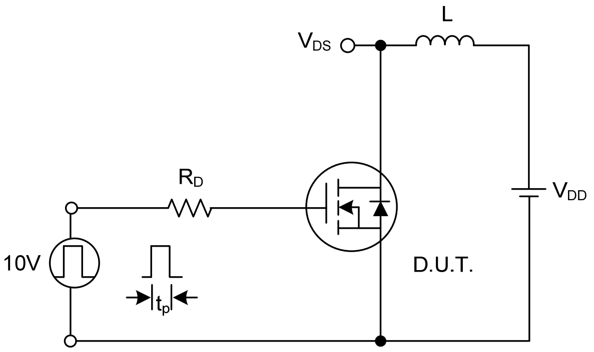
Switching Waveforms



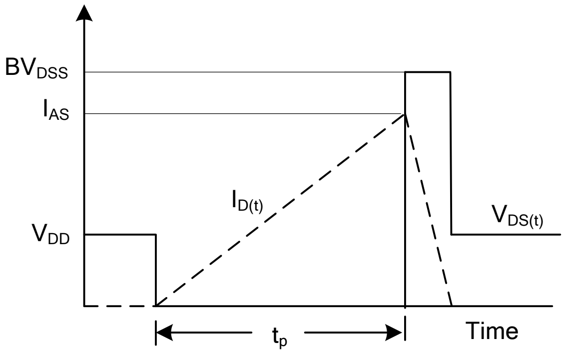
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms