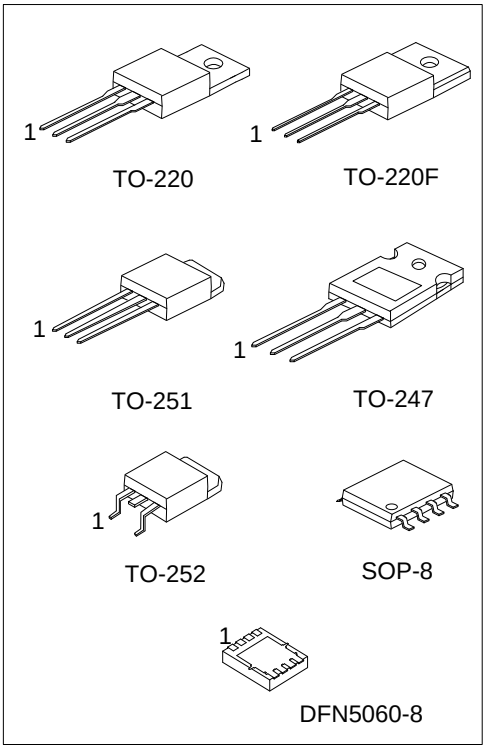
UTT60N10M

POWER MOSFET

60A, 100V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET



■ DESCRIPTION

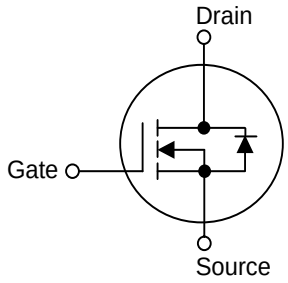
The UTC **UTT60N10M** is N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with high switching speed, a extremely low $R_{DS(ON)}$ and low gate charge.

The UTC **UTT60N10M** is suitable for high frequency Point -of-Load Synchronous, Networking DC-DC System, CCFL Back-light Inverter, etc.

■ FEATURES

* $R_{DS(ON)}$ ≤ 18 mΩ @ V_{GS}=10V, I_D=20A
  $R_{DS(ON)}$ ≤ 25 mΩ @ V_{GS}=4.5V, I_D=15A
* Green Device Available
* Low Gate Charge
* Surface mount package

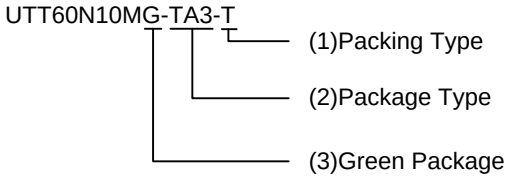
■ SYMBOL



■ ORDERING INFORMATION

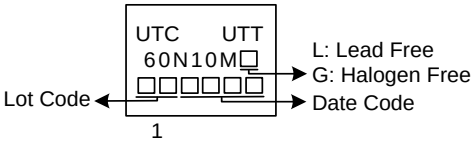
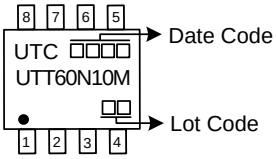
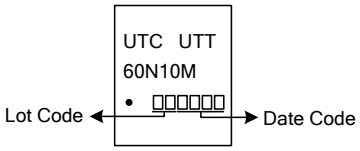
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT60N10ML-TA3-T	UTT60N10MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TF3-T	UTT60N10MG-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TM3-T	UTT60N10MG-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TN3-R	UTT60N10MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT60N10ML-T47-T	UTT60N10MG-T47-T	TO-247	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-S08-R	UTT60N10MG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTT60N10ML-K08-5060-R	UTT60N10MG-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TM3: TO-251, TN3: TO-252, T47: TO-247, S08: SOP-8, K08-5060: DFN5060-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

Package	Marking
TO-220 TO-220F TO-247 TO-251 TO-252	
SOP-8	
DFN5060-8	

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous	TO-220/TO-220F TO-251/TO-252	I_D	60	A
		SOP-8		30	A
		DFN5060-8		40	A
	Pulsed (Note 2)	TO-220/TO-220F TO-251/TO-252	I_{DM}	100	A
		SOP-8		50	A
		DFN5060-8		67	A
Avalanche Current			I_{AS}	20	A
Avalanche Energy (Note 3)			E_{AS}	200	mJ
Power Dissipation		TO-220	P_D	125	W
		TO-220F		30	W
		TO-247		312	W
		TO-251/TO-252		50	W
		SOP-8		6	W
		DFN5060-8		14	W
Junction Temperature			T_J	-40 ~ +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=1mH, I_{AS}=20A, V_{DD}=25V, R_G=25Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-247	θ_{JA}	62.5	°C/W
	TO-251/TO-252		110	°C/W
	SOP-8		50	°C/W
	DFN5060-8		65	°C/W
Junction to Case	TO-220	θ_{JC}	1	°C/W
	TO-220F		4.17	°C/W
	TO-247		0.4	°C/W
	TO-251/TO-252		2.5	°C/W
	SOP-8		20.8	°C/W
	DFN5060-8		8.93	°C/W

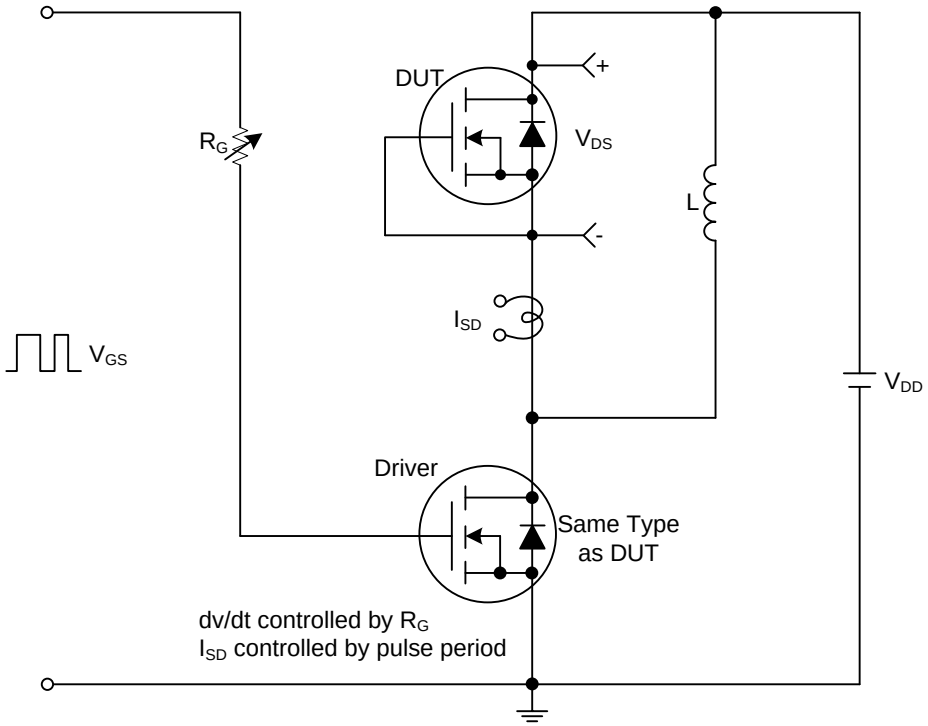
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

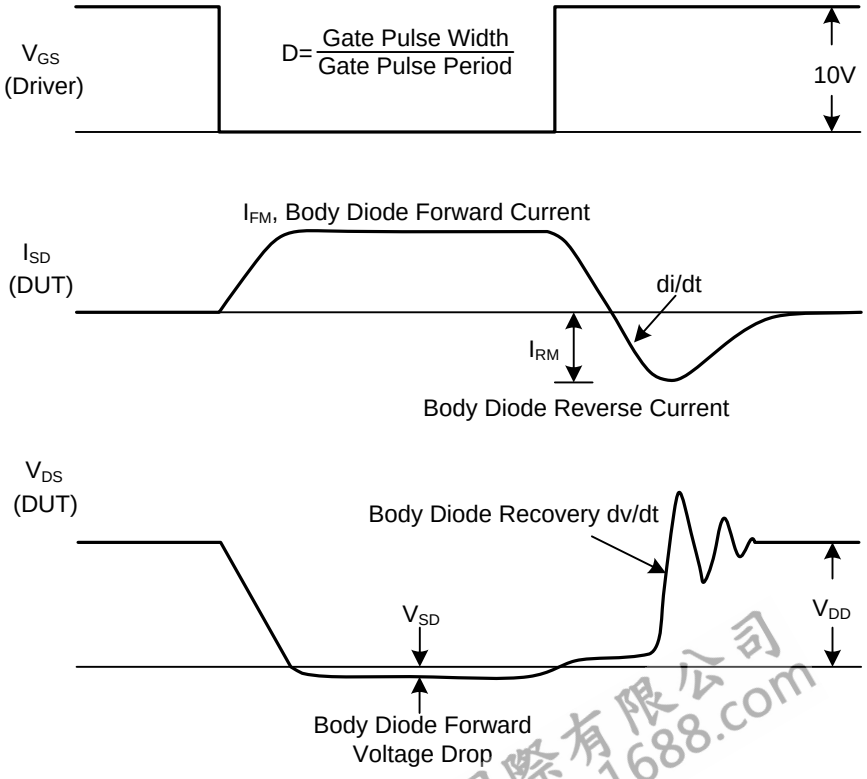
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V,T_J=25°C			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=30A			18	mΩ
			V_{GS}=4.5V, I_D=15A			25	mΩ
Forward Transconductance		g_{FS}	V_{DS}=-10V, I_D=-20A		30		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		5500		pF
Output Capacitance		C_{OSS}			250		pF
Reverse Transfer Capacitance		C_{RSS}			160		pF
Gate Resistance		R_G	V_{DS}=0V, f=1.0MHz		1		Ω
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=80V, V_{GS}=10V, I_D=60A I_G= 1mA (Note1, 2)		100		nC
Gate to Source Charge		Q_{GS}			12		nC
Gate to Drain Charge		Q_{GD}			18		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=50V, V_{GS}=10V, I_D=60A, R_G=3Ω (Note1, 2)		12		ns
Rise Time		t_R			17		ns
Turn-off Delay Time		$t_{D(OFF)}$			64		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				60	A
Forward On Voltage (Note 1)		V_{SD}	I_S=60A, V_{GS}=0V			1.2	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V, dI/dt=100A/μs		100		ns
Reverse Recovery Charge		Q_{rr}			210		nC

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

■ TEST CIRCUITS AND WAVEFORMS



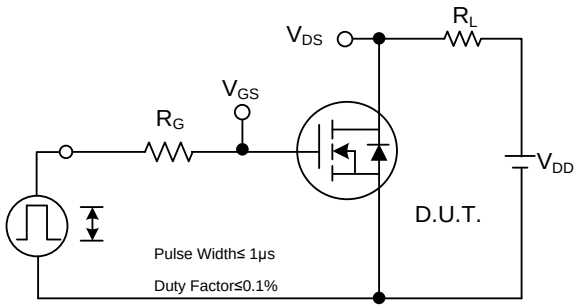
Peak Diode Recovery dv/dt Test Circuit



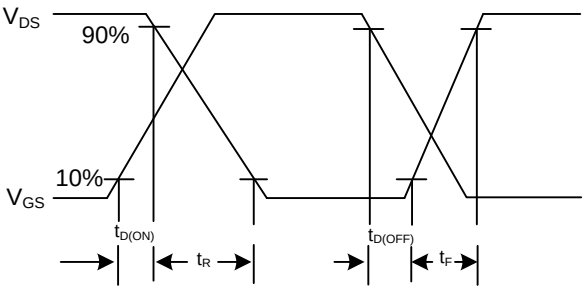
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

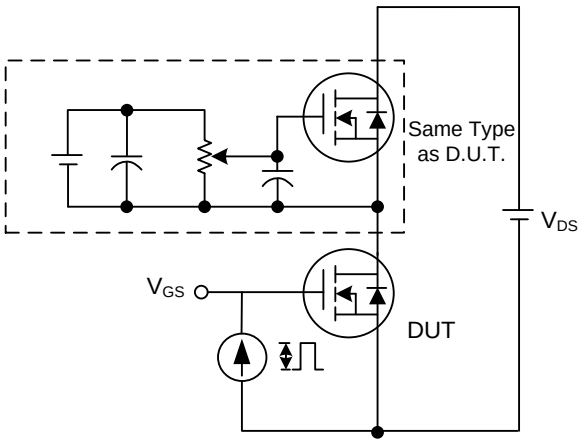
■ TEST CIRCUITS AND WAVEFORMS



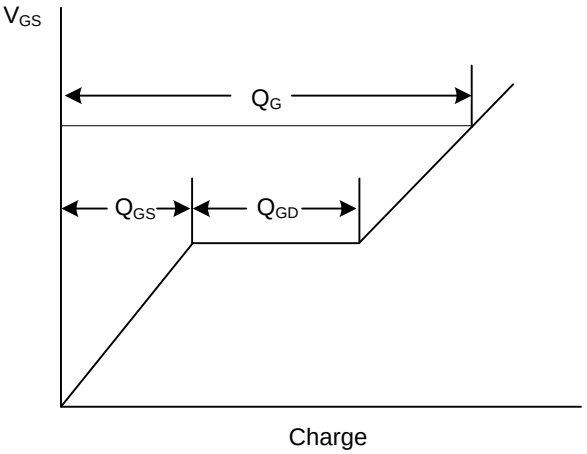
Switching Test Circuit



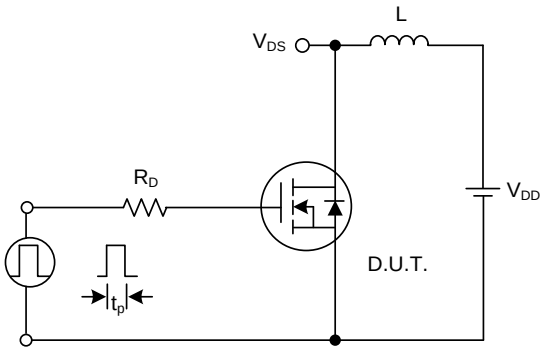
Switching Waveforms



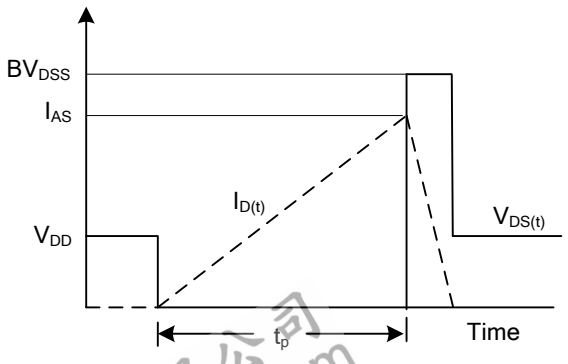
Gate Charge Test Circuit



Gate Charge Waveform



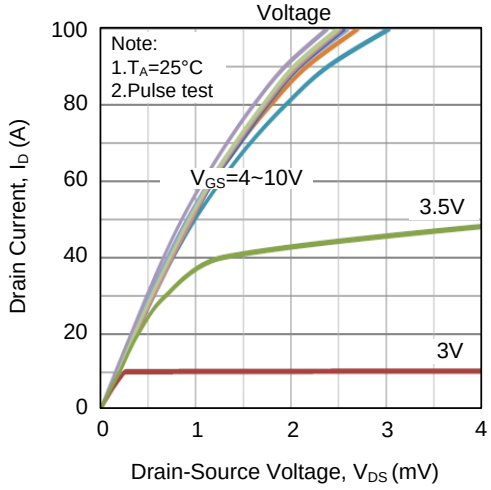
Unclamped Inductive Switching Test Circuit



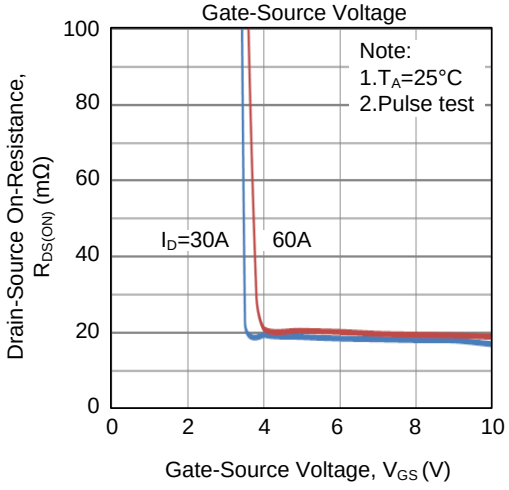
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

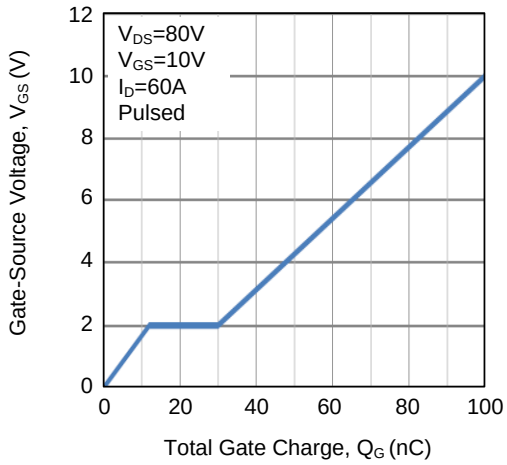
Drain Current vs. Drain-Source Voltage



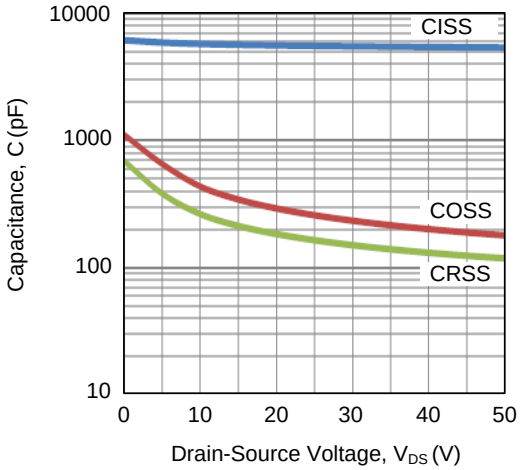
Drain-Source On-Resistance vs. Gate-Source Voltage



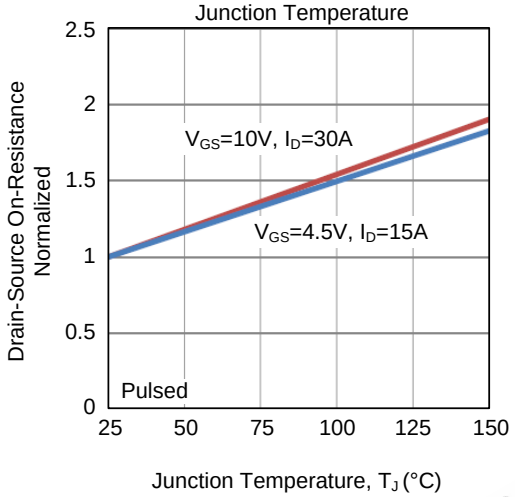
Gate Charge Characteristics



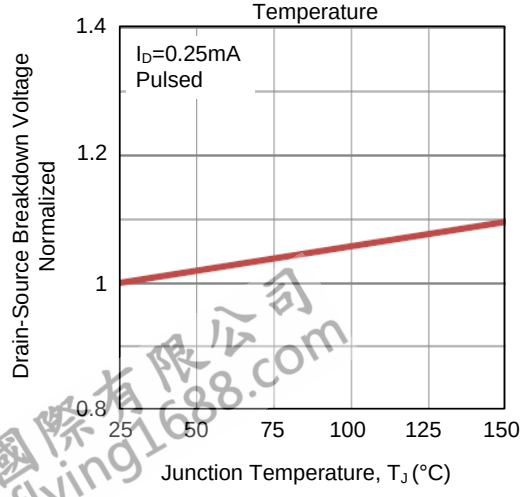
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

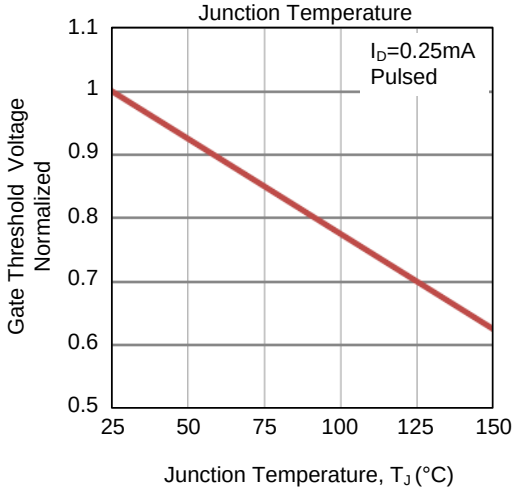


Breakdown Voltage vs. Junction Temperature

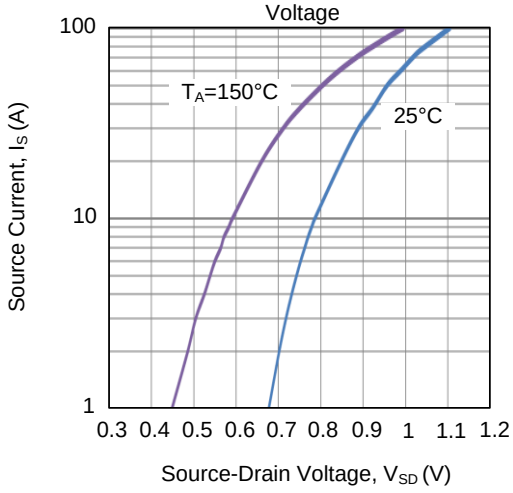


■ TYPICAL CHARACTERISTICS (Cont.)

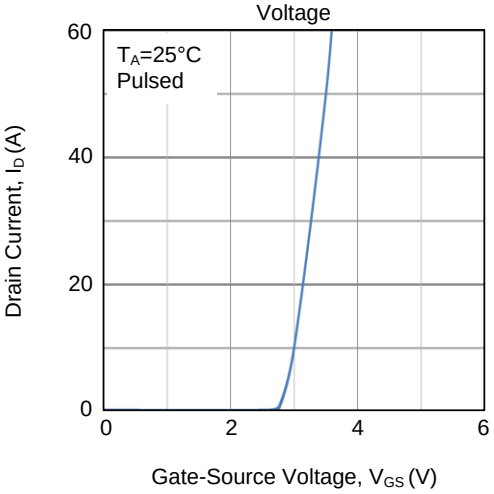
Gate Threshold Voltage vs. Junction Temperature



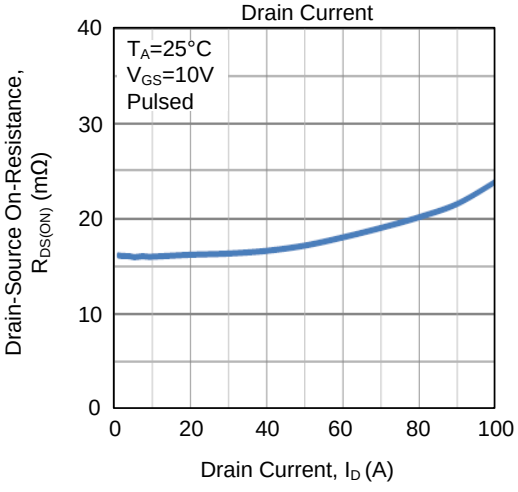
Source Current vs. Source-Drain Voltage



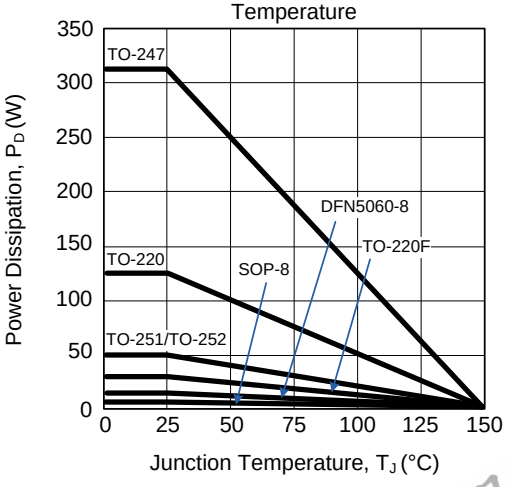
Drain Current vs. Gate-Source Voltage



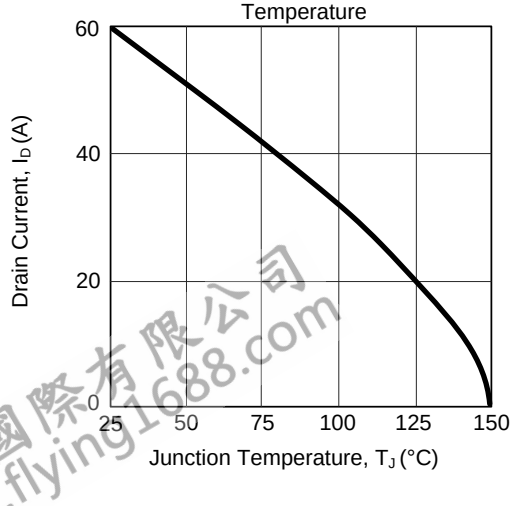
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)