



UF830-E

Power MOSFET

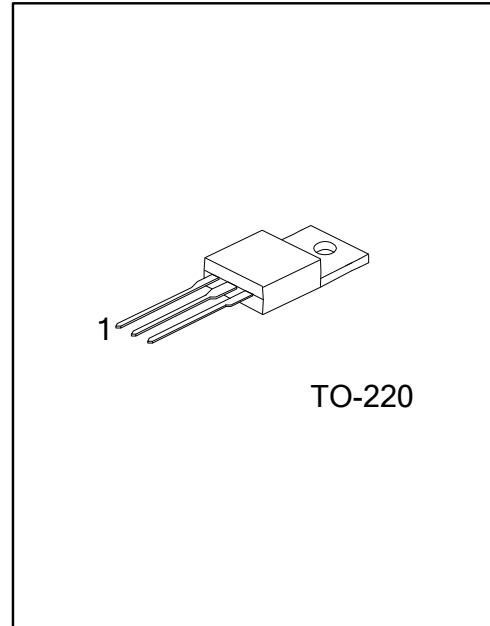
4.5A, 500V, 1.5Ω, N-CHANNEL POWER MOSFET

■ DESCRIPTION

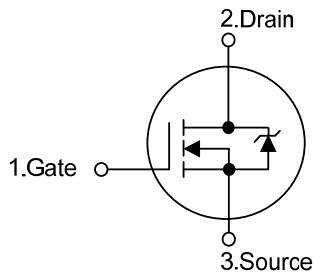
The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

- * $R_{DS(ON)} < 1.5\Omega @ V_{GS}=10V, I_D=2.5A$
- * Single Pulse Avalanche Energy Rated
- * Rugged- SOA is Power Dissipation Limited
- * Fast Switching Speeds
- * Linear Transfer Characteristics
- * High Input Impedance



■ SYMBOL



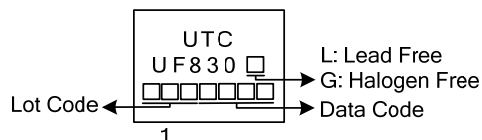
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF830L-TA3-T	UF830G-TA3-T	TO-220	G	D	S	Tube

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

UF830L-TA3-T	(1) T: Tube (2) TA3: TO-220 (3) L: Lead Free, G: Halogen Free and Lead Free
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, Unless Otherwise Specified.)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage (T _J =25°C ~125°C)		V _{DS}	500	V
Drain to Gate Voltage (R _{GS} =20kΩ, T _J =25°C ~125°C)		V _{DGR}	500	V
Gate to Source Voltage		V _{GS}	±30	V
Drain Current	Continuous	I _D	4.5	A
	Pulsed	I _{DM}	18	A
Power Dissipation (T _C = 25°C)		P _D	73	W
Single Pulse Avalanche Energy Rating (Note 2)		E _{AS}	300	mJ
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Note: 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. $V_{DD}=50\text{V}$, starting $T_J=25^\circ\text{C}$, $L=25\text{mH}$, $R_G=25\Omega$, peak $I_{AS}=4.5\text{A}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	1.71	$^\circ\text{C/W}$

■ ELECTRICAL SPECIFICATIONS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	500			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	2.0		4.0	V
On-State Drain Current (Note 1)	$I_{D(ON)}$	$V_{DS}>I_{D(ON)} \times R_{DS(ON)MAX}$, $V_{GS}=10\text{V}$	4.5			A
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = \text{Rated } BV_{DSS}$, $V_{GS}=0\text{V}$			25	μA
		$V_{DS}=0.8 \times \text{Rated } BV_{DSS}$			250	μA
		$V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$				
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30\text{V}$			± 100	nA
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$ (Note 2)		1.3	1.8	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		900	1000	pF
Output Capacitance	C_{OSS}			95	105	pF
Reverse Transfer Capacitance	C_{RSS}			35	45	pF
Forward Transconductance (Note 1)	g_{FS}	$V_{DS} \geq 10\text{V}$, $I_D=2.7\text{A}$	2.5	4.2		S
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=250\text{V}$, $I_D \approx 4.5\text{A}$ $R_{GS}=12\Omega$, $R_L=54\Omega$ (Note 2)		90	110	ns
Turn-On Rise Time	t_R			100	120	ns
Turn-Off Delay Time	$t_{D(OFF)}$			230	250	ns
Turn-Off Fall Time	t_F			140	160	ns
Total Gate Charge	Q_G	$V_{GS}=10\text{V}$, $I_D=4.5\text{A}$		22	32	nC
Gate-Source Charge	Q_{GS}	$V_{DS}=0.8 \times \text{Rated } BV_{DSS}$		3.5		nC
Gate-Drain Charge	Q_{GD}	$I_{G(REF)}=1.5\text{mA}$ (Note 3)		11		nC

Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

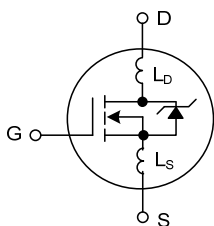
2. MOSFET Switching Times are Essentially Independent of Operating Temperature.

3. Gate Charge is Essentially Independent of Operating Temperature.

■ INTERNAL PACKAGE INDUCTANCE

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Internal Drain Inductance					
Measured from the contact screw on tab to center of die	L _D		3.5		nH
Measured from the drain lead(6mm from package) to center of die			4.5		nH
Internal Source Inductance					
Measured from the source lead(6mm from header) to source bond pad	L _S		7.5		nH

Remark: Modified MOSFET symbol showing the internal devices inductances as below.

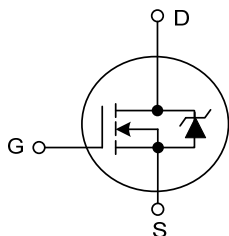


■ SOURCE TO DRAIN DIODE SPECIFICATIONS

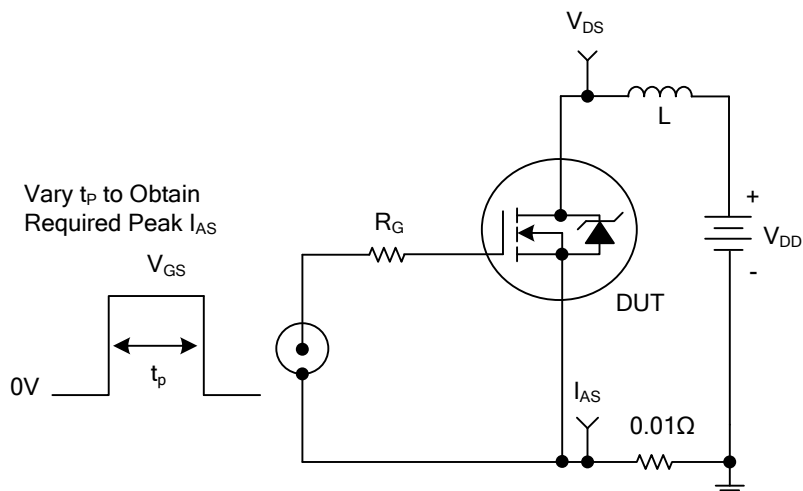
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Source to Drain Diode Voltage	V_{SD}	$T_J=25^{\circ}\text{C}$, $I_{SD}=4.5\text{A}$, $V_{GS}=0\text{V}$ (Note 1)			1.6	V
Continuous Source to Drain Current	I_{SD}	Note 2			5.5	A
Pulse Source to Drain Current	I_{SDM}				18	A
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}\text{C}$, $I_{SD}=4.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$	180	350	760	ns
Reverse Recovery Charge	Q_{RR}	$T_J=25^{\circ}\text{C}$, $I_{SD}=4.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$	0.96	2.2	4.3	μC

Notes : 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

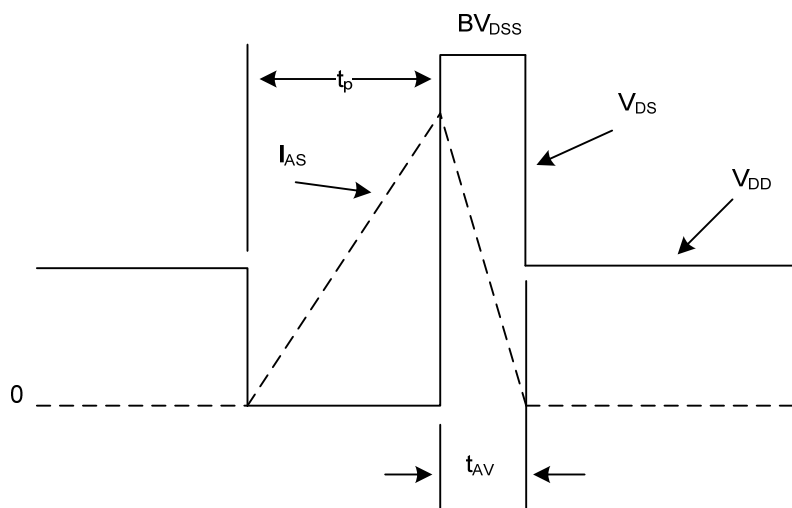
2. Modified MOSFET symbol showing the integral reverse P-N junction diode as below.



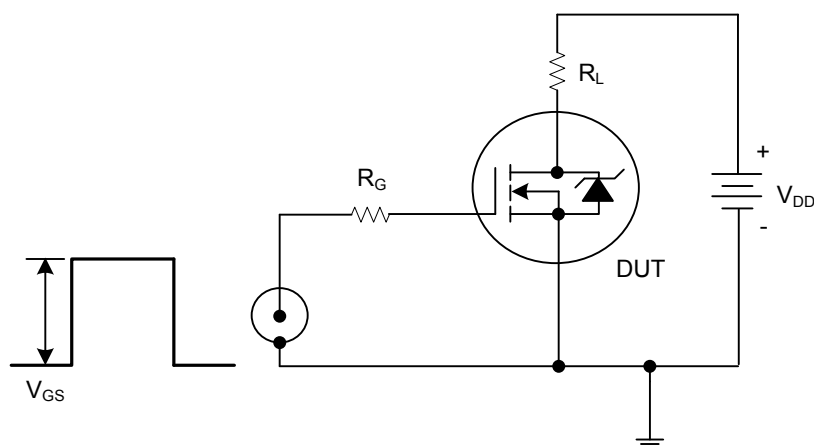
■ TEST CIRCUITS AND WAVEFORMS



Unclamped Energy Test Circuit



Unclamped Energy Waveforms



Switching Time Test Circuit

12V BATTERY!

0.2 μ F

50K Ω

0.3 μ F

Current Regulator

Same Type as DUT

D

G

S

I_G (REF)

I_G Current Sampling Resistor

I_D Current Sampling Resistor

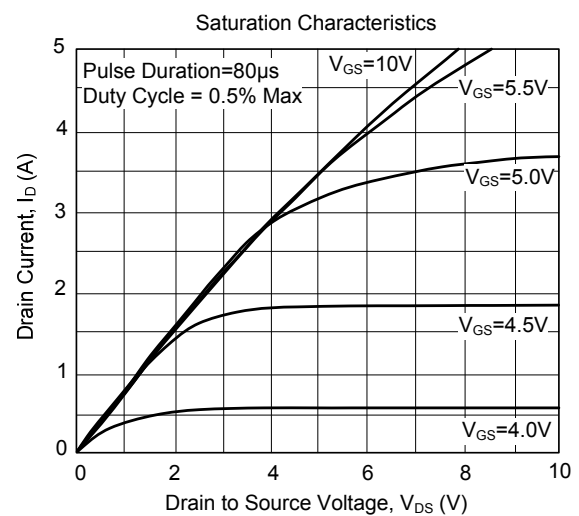
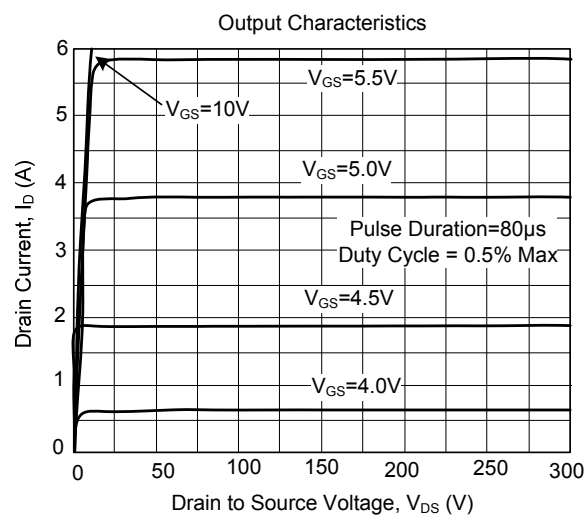
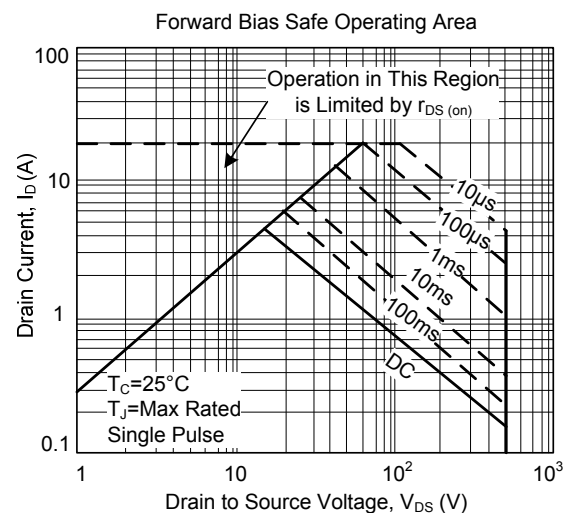
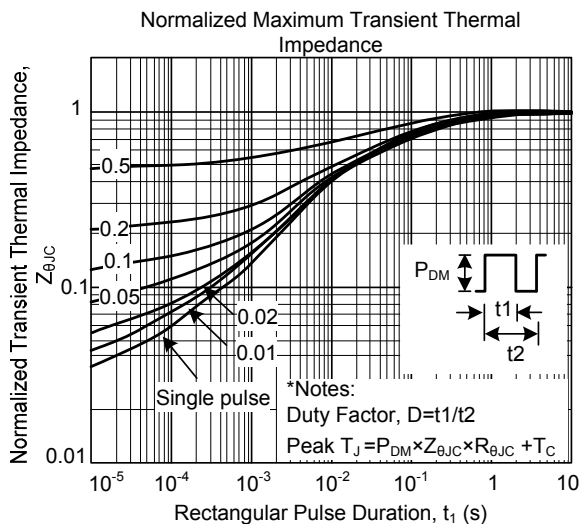
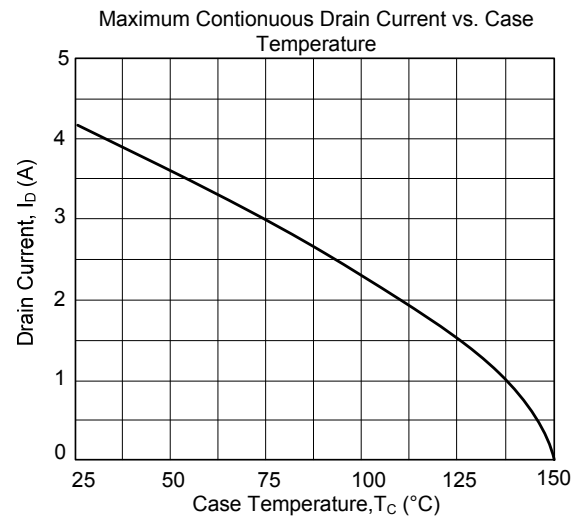
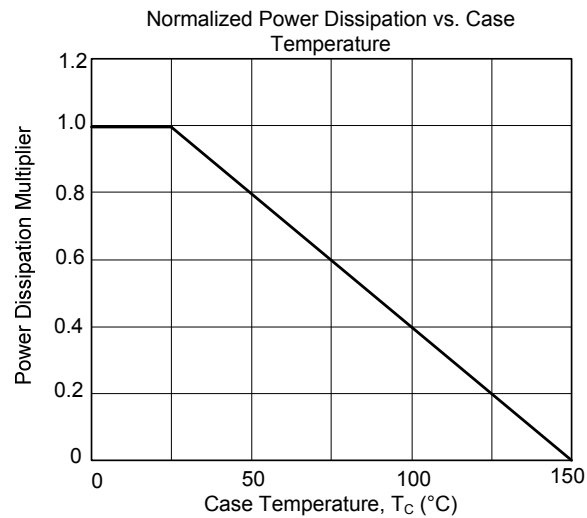
V_{DS} (Isolated Supply)

V_{DS}

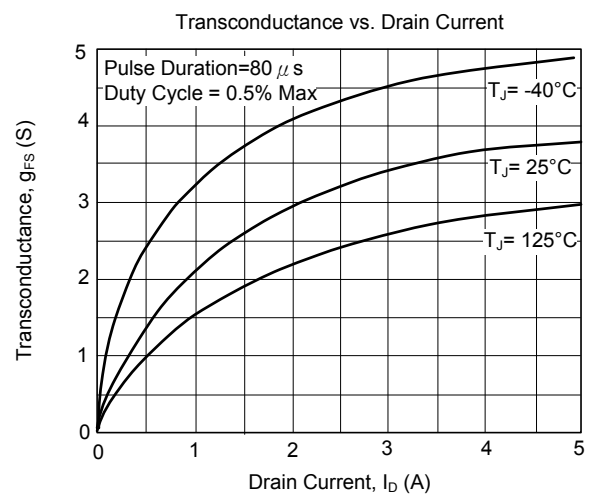
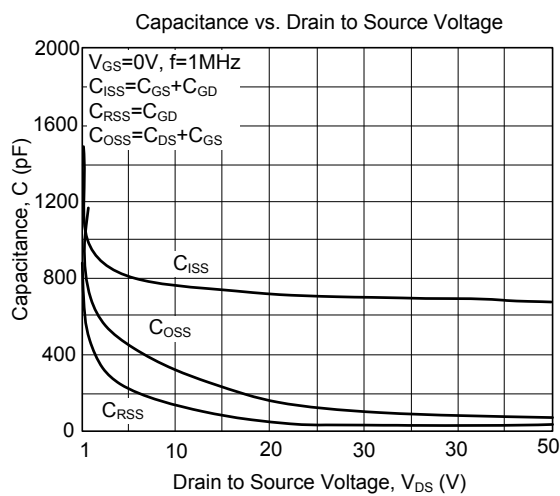
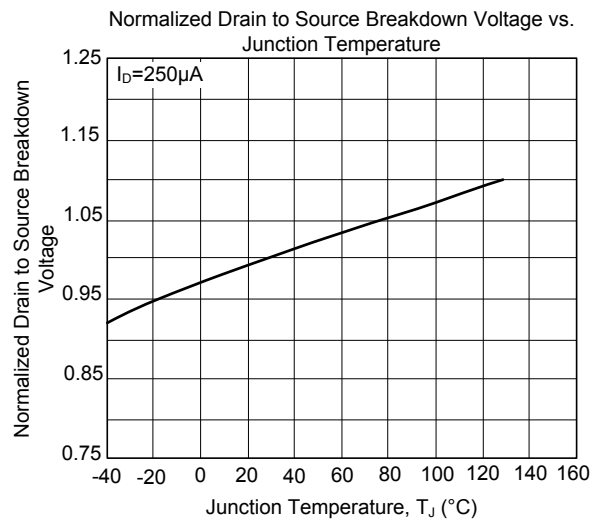
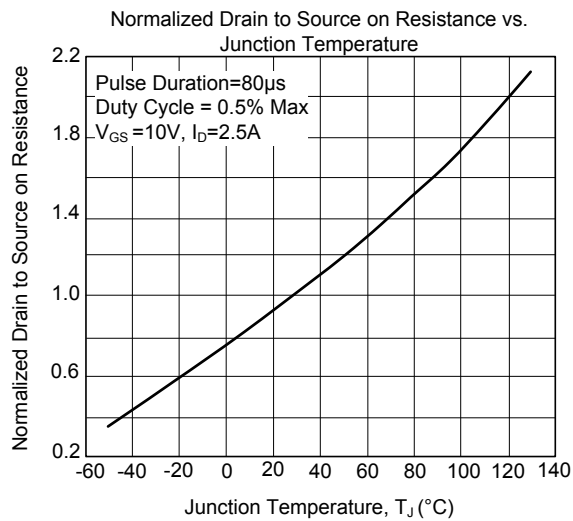
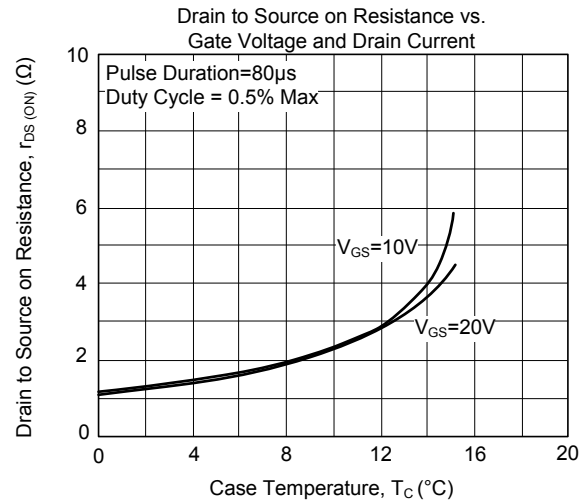
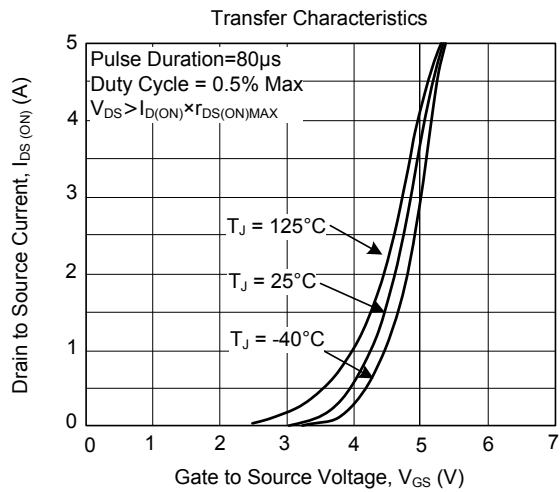


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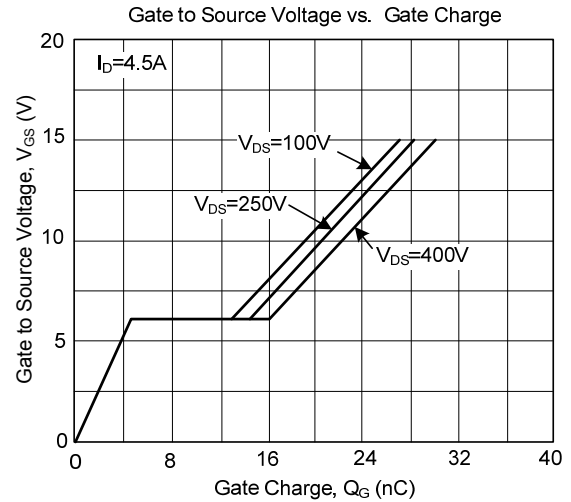
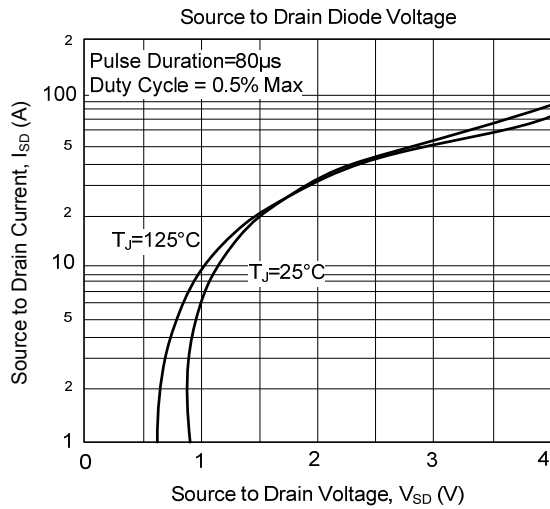
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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