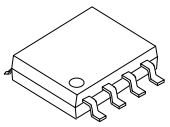
UT5003Z

Power MOSFET

DUAL ENHANCEMENT MODE (N-CHANNEL/P-CHANNEL)



SOP-8

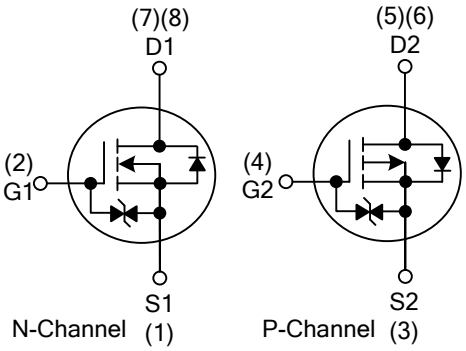
■ DESCRIPTION

The **UT5003Z** can provide excellent $R_{DS\ (ON)}$ and low gate charge by using UTC's advanced trench technology. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

* N-Channel: 30V/7A
  $R_{DS(ON)}$ = 27.5mΩ @ V_{GS} =10V
  $R_{DS(ON)}$ = 40mΩ @ V_{GS}= 4.5V
* P-Channel: -30V/-5A
  $R_{DS(ON)}$ = 45mΩ @ V_{GS}= -10V
  $R_{DS(ON)}$ = 80mΩ @ V_{GS}= -4.5V

■ SYMBOL



■ ORDERING INFORMATION

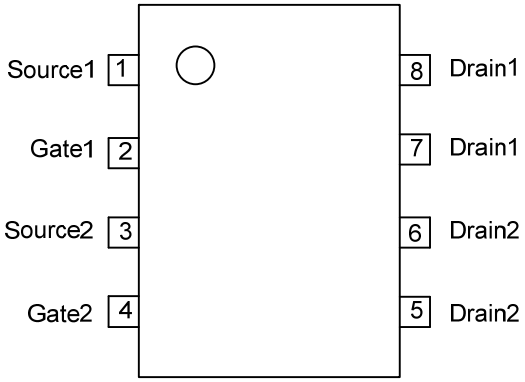
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UT5003ZL-S08-R	UT5003ZG-S08-R	SOP-8	Tape Reel

UT5003ZL-S08-R

(1) Packing Type
(2) Package Type
(3) Lead Free

(1) R: Tape Reel
(2) S08: SOP-8
(3) G: Halogen Free, L: Lead Free

■ PIN CONFIGURATION



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

N-Channel:

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note3)	T_C=25°C	I_D	7	A
Pulsed Drain Current (Note3)	T_C=25°C	I_{DM}	20	A
Power Dissipation		P_D	2	W
Junction Temperature		T_J	+150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃

P-Channel:

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note3)	T_C=25°C	I_D	-5	A
Pulsed Drain Current (Note3)	T_C=25°C	I_{DM}	-20	A
Power Dissipation		P_D	2	W
Junction Temperature		T_J	+150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃

Note: 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.

■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction to Ambient (Note3)	θ_{JA}			62.5	℃/W

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

N-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	30			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	uA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±5	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1	1.5	2.5	V
Drain-Source On-State Resistance (Note2)	$R_{DS(ON)}$	V_{GS}=10V, I_D=7A		20.5	27.5	mΩ
		V_{GS}=4.5V, I_D=6A		30	40	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1MHz		680		pF
Output Capacitance	C_{OSS}			105		pF
Reverse Transfer Capacitance	C_{RSS}			75		pF
SWITCHING CHARACTERISTICS						
Turn-ON Delay Time (Note2)	$t_{D(ON)}$	V_{DS}=10V, V_{GS}=10V, I_D≒1A, R_G=3Ω		4.6	7	ns
Turn-ON Rise Time	t_R			4	6	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20	30	ns
Turn-OFF Fall Time	t_F			5	8	ns
Total Gate Charge (Note2)	Q_G	V_{DS}=0.5*BV_{DSS}, V_{GS}=10V, I_D=7A		14		nC
Gate-Source Charge	Q_{GS}			1.9		nC
Gate-Drain Charge	Q_{GD}			3.3		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage(Note2)	V_{SD}	I_S=1A, V_{GS}=0V			1	V
Diode Continuous Forward Current	I_S				1.3	A

P-CHANNEL

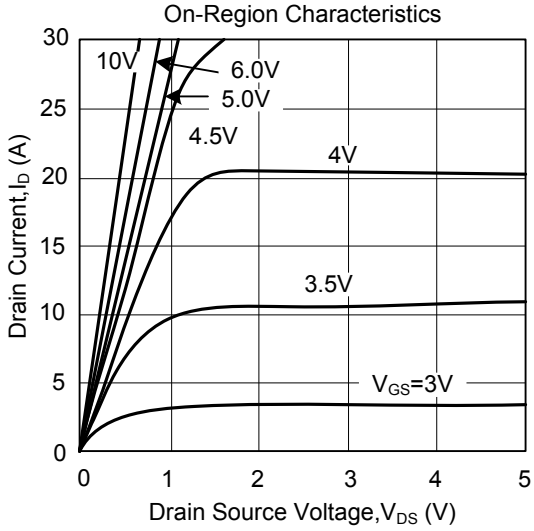
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-30			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V			-1	uA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±5	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250uA	-1	-1.5	-2.5	V
Drain-Source On-State Resistance (Note2)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5A		37.5	45	mΩ
		V_{GS}=-4.5V, I_D=-4A		62	80	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=-15V, f=1MHz		780		pF
Output Capacitance	C_{OSS}			145		pF
Reverse Transfer Capacitance	C_{RSS}			79		pF
SWITCHING CHARACTERISTICS						
Turn-ON Delay Time (Note2)	$t_{D(ON)}$	V_{DS}=-10V, V_{GS}=-10V, I_D≒1A, R_G=3Ω		7.7	11.5	ns
Turn-ON Rise Time	t_R			5.7	8.5	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20	30	ns
Turn-OFF Fall Time	t_F			9.5	14	ns
Total Gate Charge (Note2)	Q_G	V_{DS}=0.5*BV_{DSS}, V_{GS}=-10V, I_D=-5A		15.1		nC
Gate-Source Charge	Q_{GS}			2.1		nC
Gate-Drain Charge	Q_{GD}			4.0		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage(Note2)	V_{SD}	I_S=-1A, V_{GS}=0V			-1	V
Diode Continuous Forward Current	I_S				-1.3	A

Notes: 1. Pulse width limited by $T_{J(MAX)}$
2. Pulse width ≤300us, duty cycle ≤2%.
3. Surface Mounted on 1in^2 pad area, t⩽10sec.

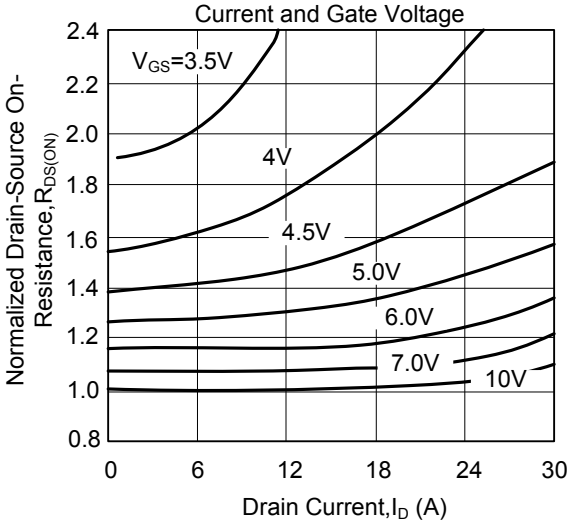
■ TYPICAL CHARACTERISTICS

N-CHANNEL:

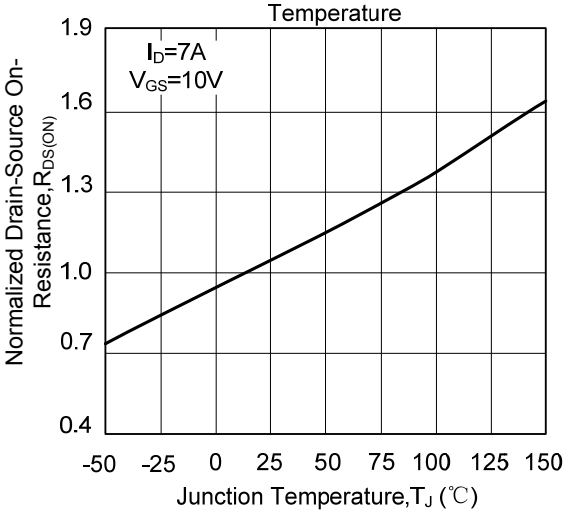
On-Region Characteristics



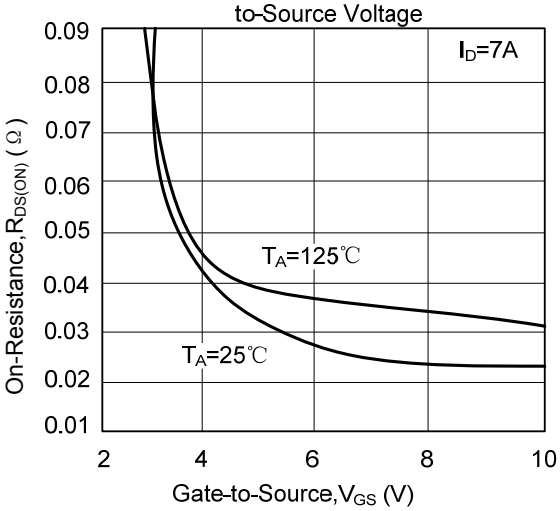
On-Resistance Variation with Drain Current and Gate Voltage



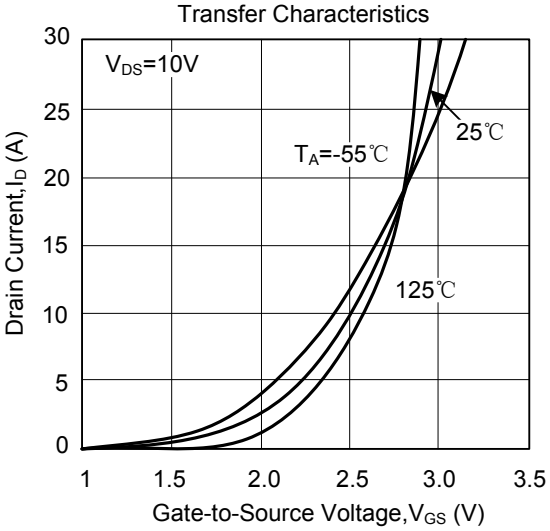
On-Resistance Variation with Temperature



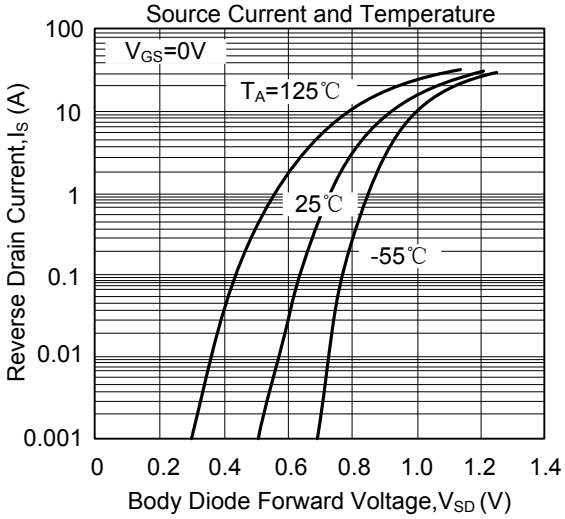
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics

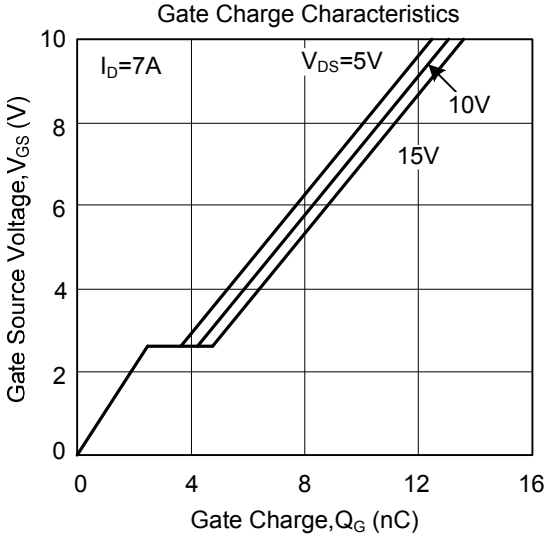


Body Diode Forward Voltage Variation with Source Current and Temperature

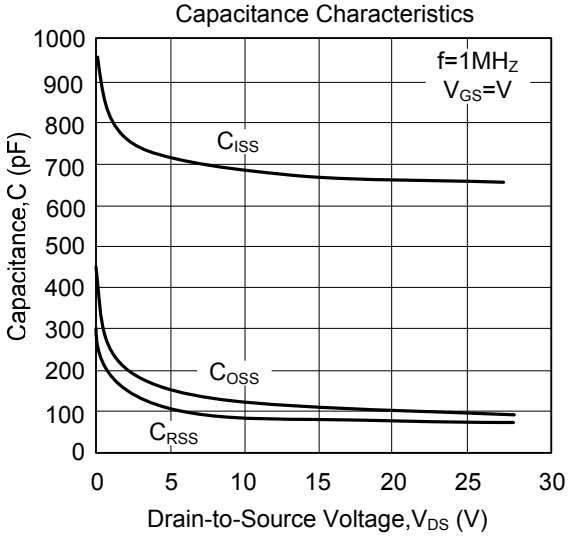


■ TYPICAL CHARACTERISTICS(Cont.)

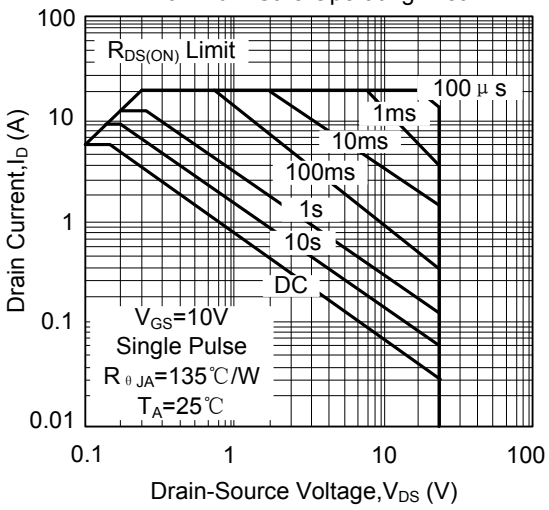
Gate Charge Characteristics



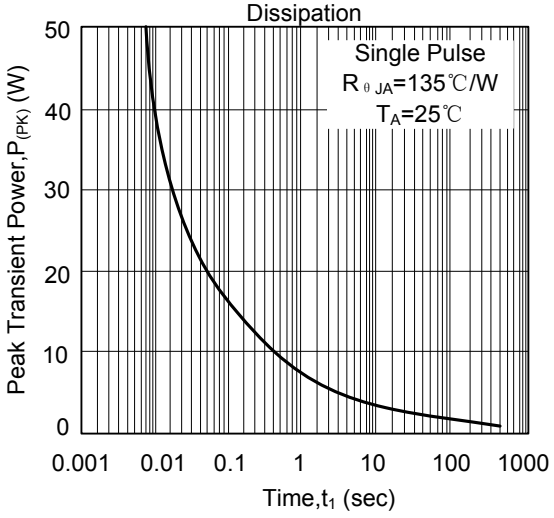
Capacitance Characteristics



Maximum Safe Operating Area

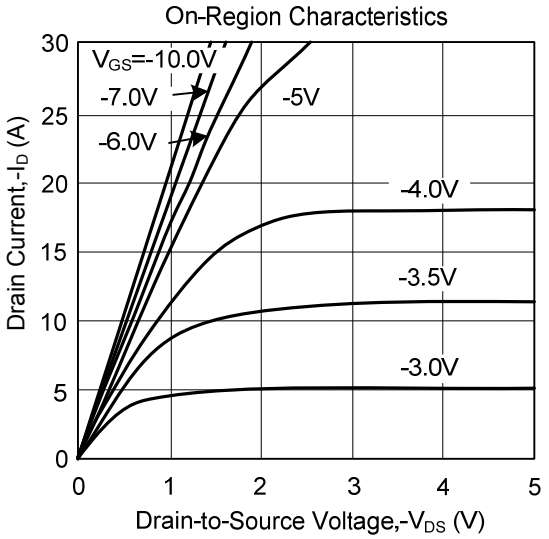


Single Pulse Maximum Power Dissipation

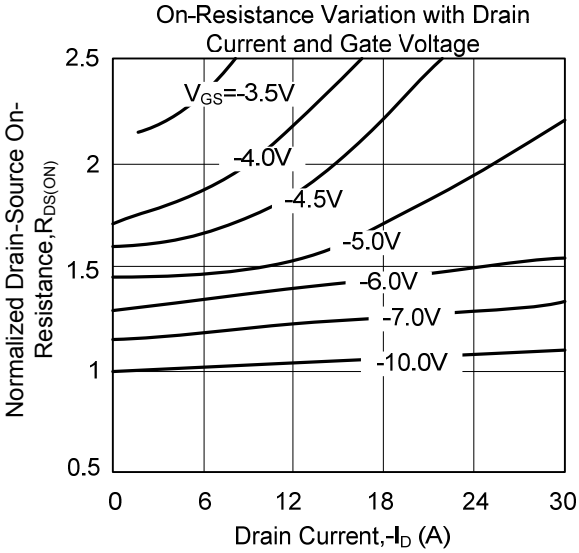


P-CHANNEL

On-Region Characteristics

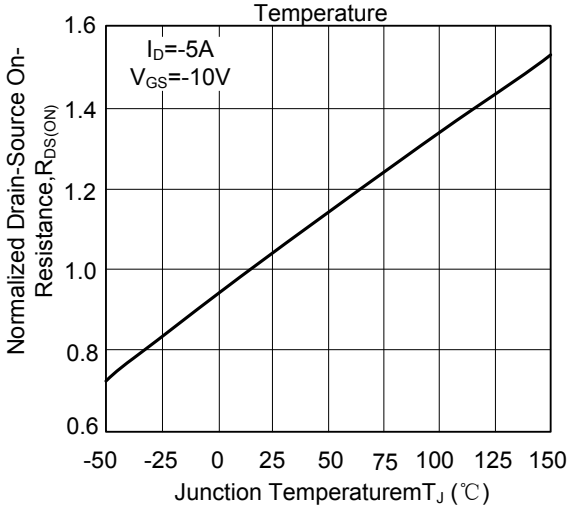


On-Resistance Variation with Drain Current and Gate Voltage

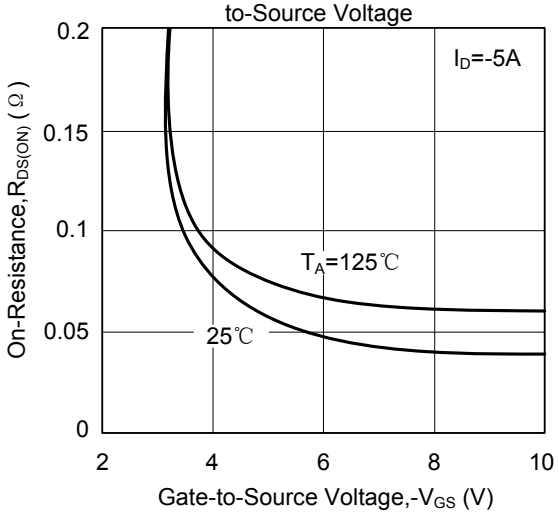


■ TYPICAL CHARACTERISTICS(Cont.)

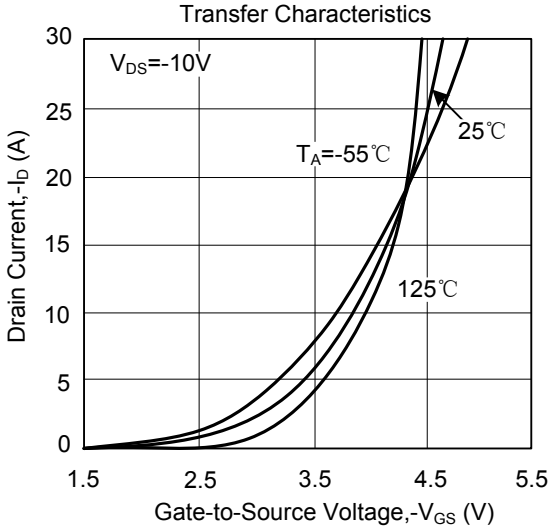
On-Resistance Variation with Temperature



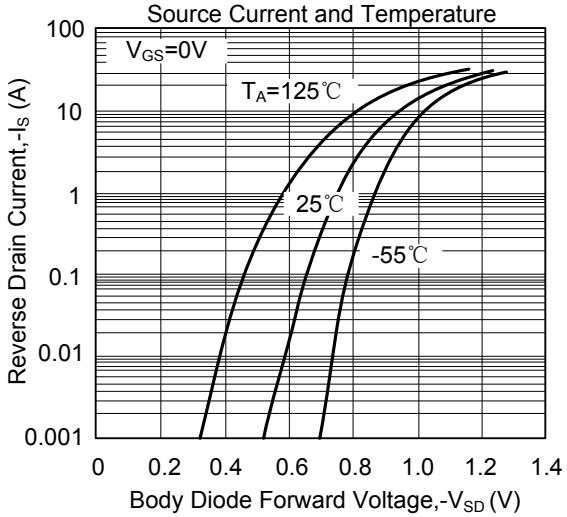
On-Resistance Variation with Gate-to-Source Voltage



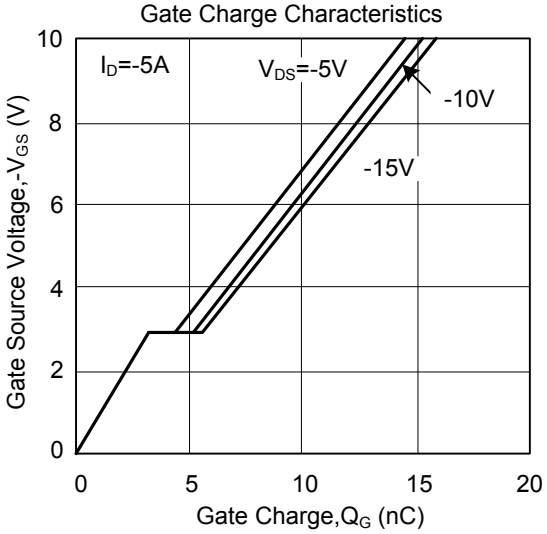
Transfer Characteristics



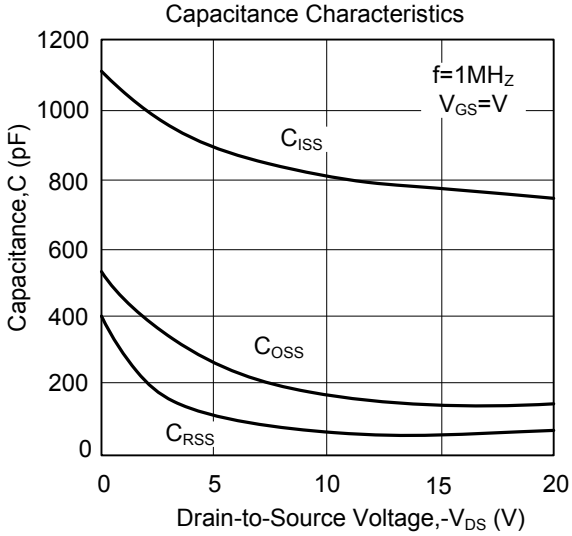
Body Diode Forward Voltage Variation with Source Current and Temperature



Gate Charge Characteristics



Capacitance Characteristics



■ TYPICAL CHARACTERISTICS(Cont.)