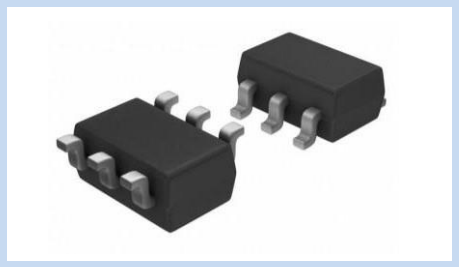
N/P Channel MOSFET
±20V 4.1/-3.1A 0.35W SOT-23-6L

MFT2NP4A1S236

MERITEK

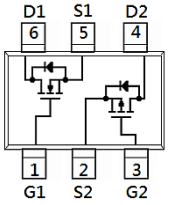
FEATURE



- $R_{DS(ON)}$<150mΩ, V_{GS}=4.5V, I_D=1A
- $R_{DS(ON)}$<215mΩ, V_{GS}=2.5V, I_D=0.7A
- $R_{DS(ON)}$<400mΩ, V_{GS}=1.8V, I_D=0.3A
- Advanced Trench Process Technology
- Application: Switch Load, PWM Application, etc.

MECHANICAL DATA

- Case: SOT-23-6L Package
- Terminals: Solderable per MIL-STD-750, Method 2026



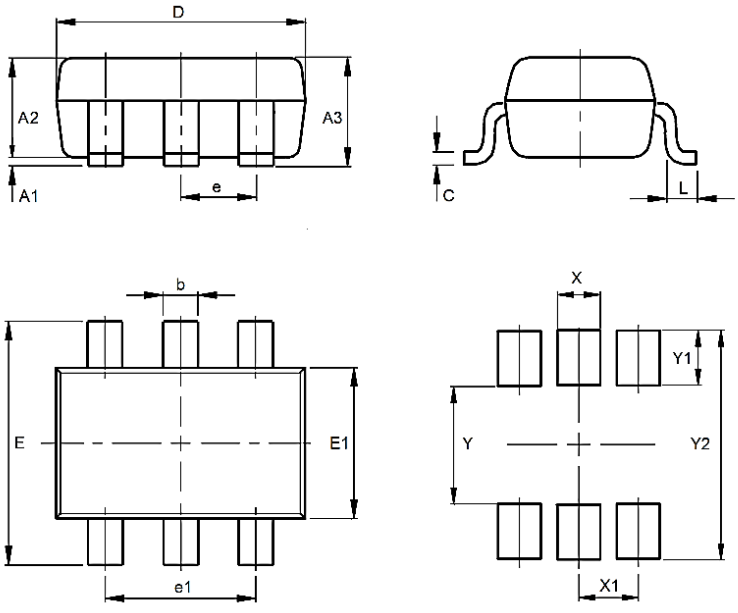
RoHS

MAXIMUM RATINGS

Parameter		Symbol	Value		Unit
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Drain Current – Continuous		I_D	4.1	-3.1	A
Drain Current – Pulsed		I_{DM}	16.4	-12.4	A
Power Dissipation	T_A= 25°C	P_D	1.25		W
	Derate above 25°C		10		mW/°C
Thermal Resistance Junction to Ambient		$R_{\theta JA}$	100		°C/W
Operating Junction and Storage Temperature		T_J, T_{STG}	-55~150		°C

DIMENSIONS

Item	Min (mm)	Max (mm)
A1	--	0.10
A2	1.00	1.20
A3	1.00	1.30
b	0.30	0.50
c	0.08	0.20
D	2.70	3.10
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.70	2.10
L	0.20	0.60
X	0.80	
X1	0.95	
Y	1.10	
Y1	0.90	
Y2	2.90	



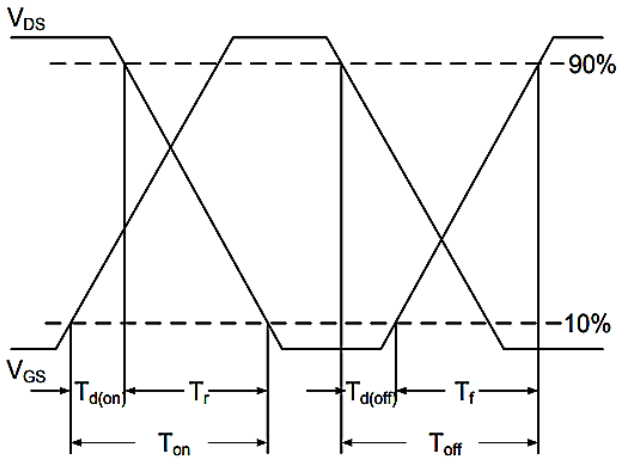
ELECTRICAL CHARACTERISTICS - N-CH

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	BV_{DSS}	20	--	--	V
Drain-Source Leakage Current	V_{DS}=20V, V_{GS}=0V,	I_{DSS}	--	--	1	μA
Gate-Source Leakage Current	V_{GS}=±12V, V_{DS}=0V	I_{GSS}	--	--	±100	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=4.1A	$R_{DS(ON)}$	--	41	56	mΩ
	V_{GS}=2.5V, I_D=2.8A		--	50	60	mΩ
	V_{GS}=1.8V, I_D=1.5A		--	66	95	mΩ
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	$V_{GS(th)}$	0.4	0.66	1.2	V
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_D=4.1A	Q_g	--	4.6	--	nC
Gate-Source Charge		Q_{gs}	--	0.8	--	nC
Gate-Drain Charge		Q_{gd}	--	1.0	--	nC
Turn-On Delay Time	V_{DD}=10V, V_{GS}=4.5V, R_G=6Ω, I_D=4.1A	$T_{d(on)}$	--	4	--	ns
Rise Time		T_r	--	47	--	ns
Turn-Off Delay Time		$T_{d(off)}$	--	18	--	ns
Fall Time		T_f	--	10	--	ns
Input Capacitance	V_{DS}=10V, V_{GS}=0V, F=1MHz	C_{iss}	--	350	--	pF
Output Capacitance		C_{oss}	--	40	--	pF
Reverse Transfer Capacitance		C_{rss}	--	29	--	pF
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Continuous Source Current	--	I_S	--	--	1.5	A
Diode Forward Voltage	V_{GS}=0V , I_S=1A	V_{SD}	--	0.75	1.2	V

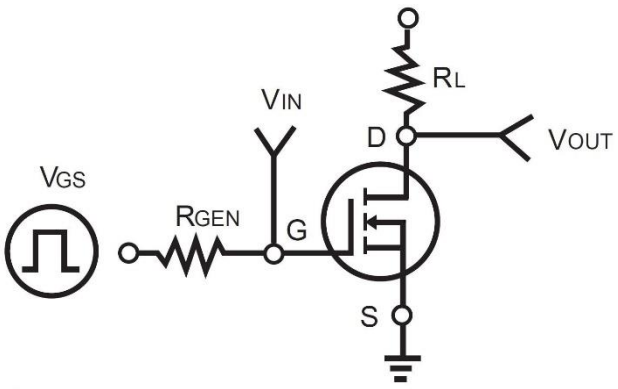
Note:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on 1 inch FR-4 with 2oz. Square pad of copper.
2. Pulse width ≤ 300μs, duty cycle ≤2%.
3. Essentially independent of operating temperature.
4. Guarantee by design, not test in mass production.
5. The Maximum current rating is package limited.

Switching Time Waveform



Switching Test Circuit



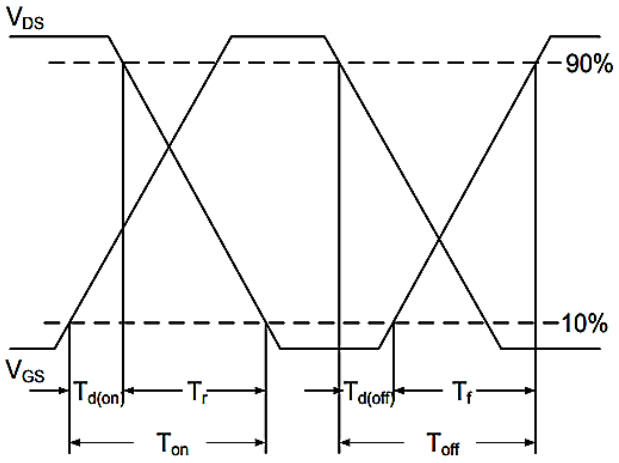
ELECTRICAL CHARACTERISTICS - P-CH

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250μA	BV_{DSS}	-20	--	--	V
Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V	I_{DSS}	--	--	-1	μA
Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	I_{GSS}	--	--	±100	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-3.1A	$R_{DS(ON)}$	--	84	100	mΩ
	V_{GS}=-2.5V, I_D=-2.0A		--	104	135	mΩ
	V_{GS}=-1.8V, I_D=-1.1A		--	134	190	mΩ
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=-250μA	$V_{GS(th)}$	-0.4	-0.71	-1.2	V
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=-10V, V_{GS}=-4.5V, I_D=-3.1A	Q_g	--	5.4	--	nC
Gate-Source Charge		Q_{gs}	--	0.7	--	nC
Gate-Drain Charge		Q_{gd}	--	1.3	--	nC
Turn-On Delay Time	V_{DD}=-10V, V_{GS}=-4.5V, R_G=6Ω I_D=-3.1A	$T_{d(on)}$	--	4	--	ns
Rise Time		T_r	--	27	--	ns
Turn-Off Delay Time		$T_{d(off)}$	--	78	--	ns
Fall Time		T_f	--	45	--	ns
Input Capacitance	V_{DS}=-10V, V_{GS}=0V, F=1MHz	C_{iss}	--	416	--	pF
Output Capacitance		C_{oss}	--	43	--	pF
Reverse Transfer Capacitance		C_{rss}	--	32	--	pF
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Continuous Source Current	--	I_S	--	--	-1.5	A
Diode Forward Voltage	V_{GS}=0V , I_S=-1A	V_{SD}	--	-0.6	-1.2	V

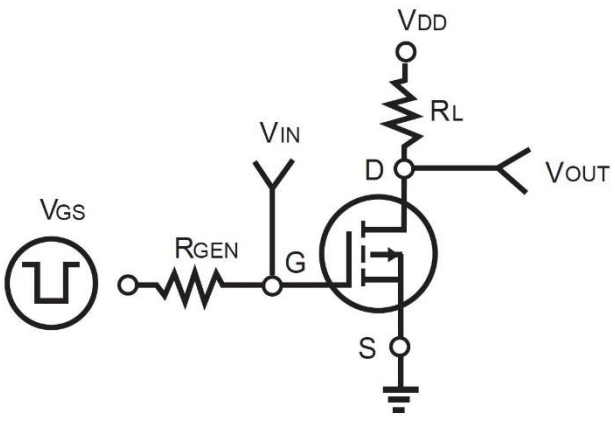
Note:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on 1 inch FR-4 with 2oz. Square pad of copper.
2. Pulse width ≤ 300μs, duty cycle ≤2%.
3. Essentially independent of operating temperature.
4. Guarantee by design, not test in mass production.
5. The Maximum current rating is package limited.

Switching Time Waveform

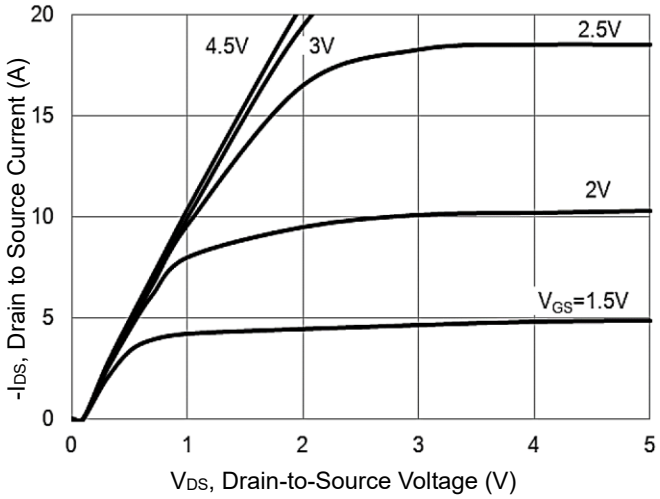


Switching Test Circuit

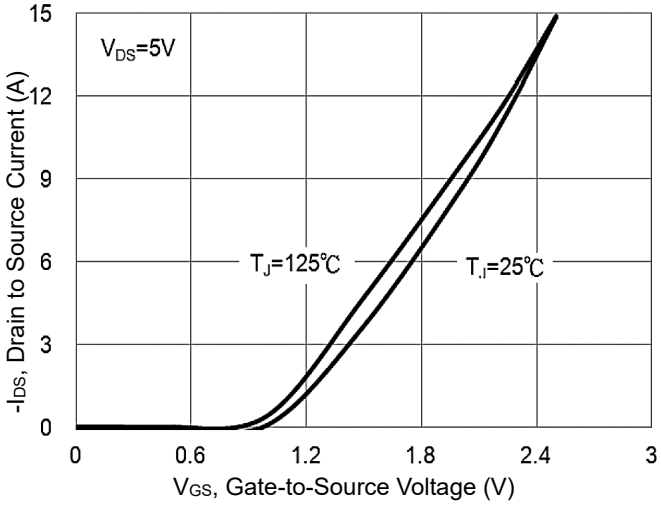


N-CH CHARACTERISTIC CURVES

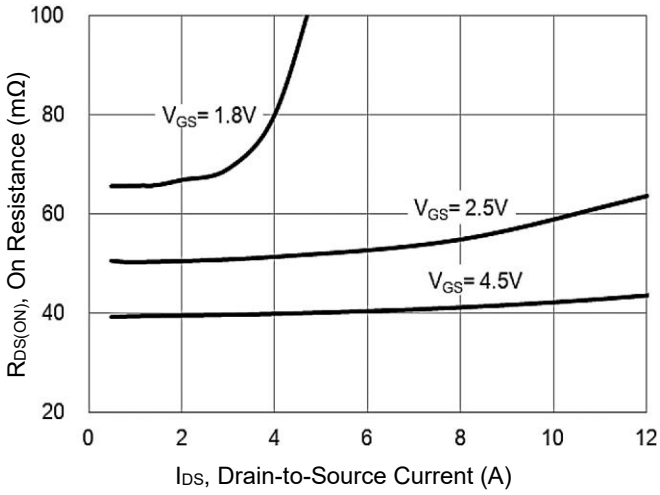
On-Region Characteristics



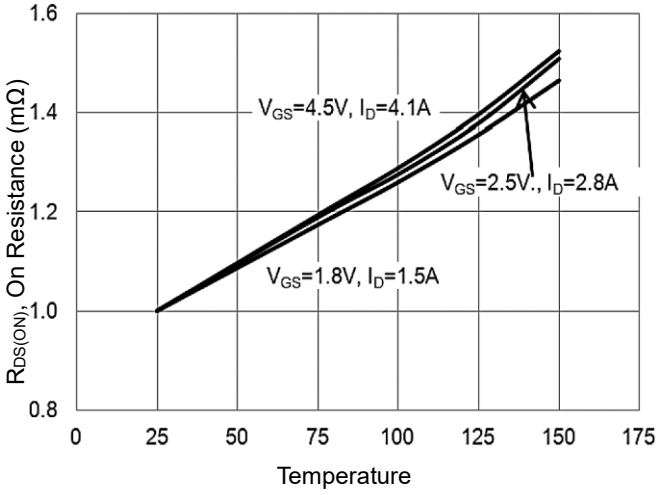
Transfer Characteristics



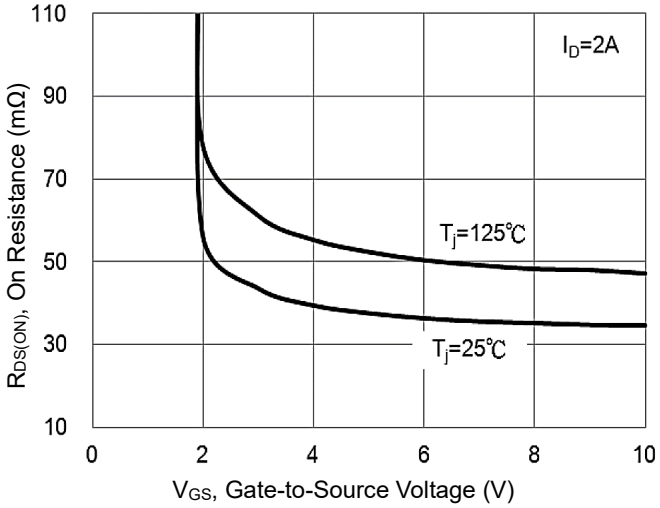
On-Resistance vs Drain Current



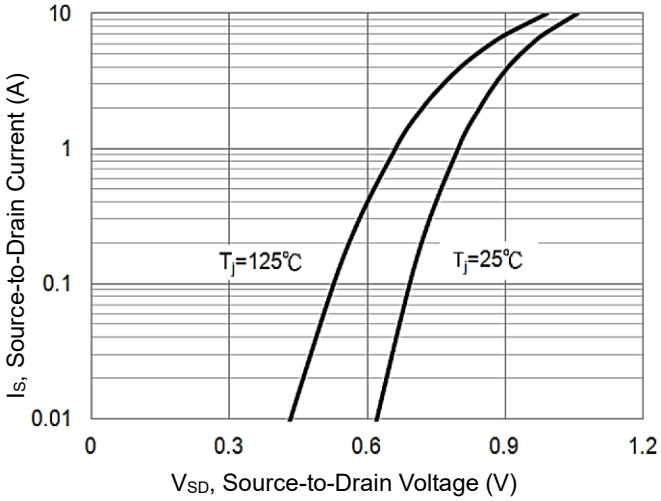
On-Resistance vs Junction Temperature



On-Resistance Variation with V_{GS}

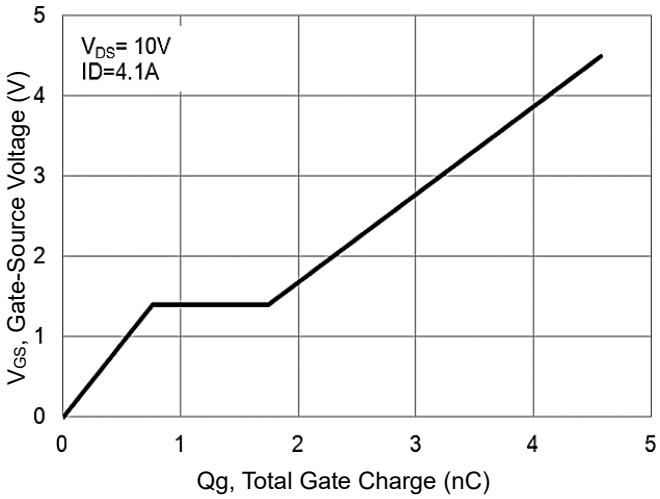


Body Diode

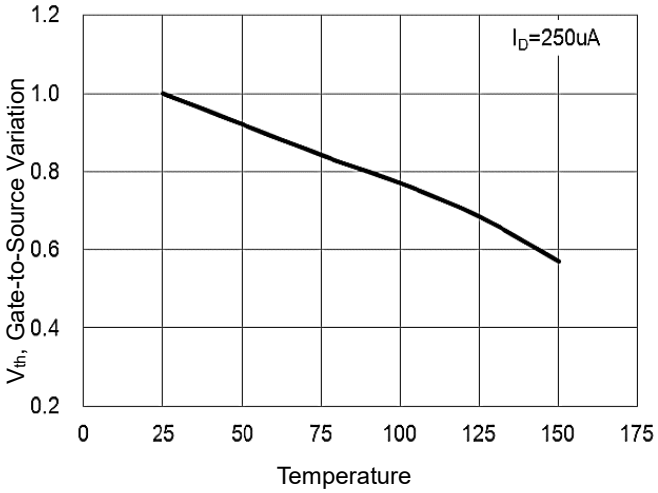


N-CH CHARACTERISTIC CURVES

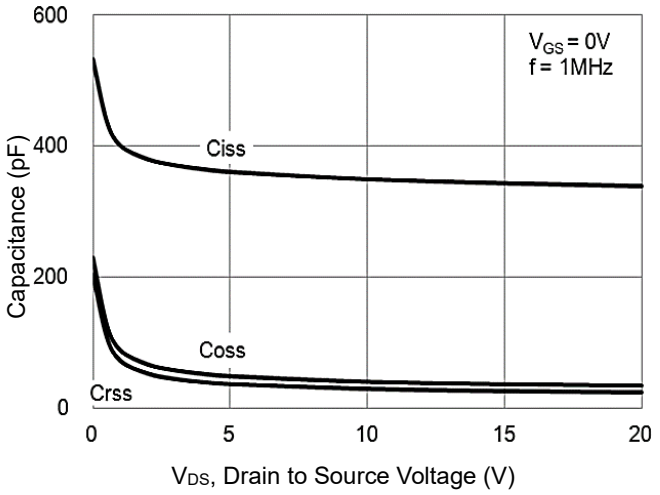
Gate Charge



Threshold Voltage Variation with temperature

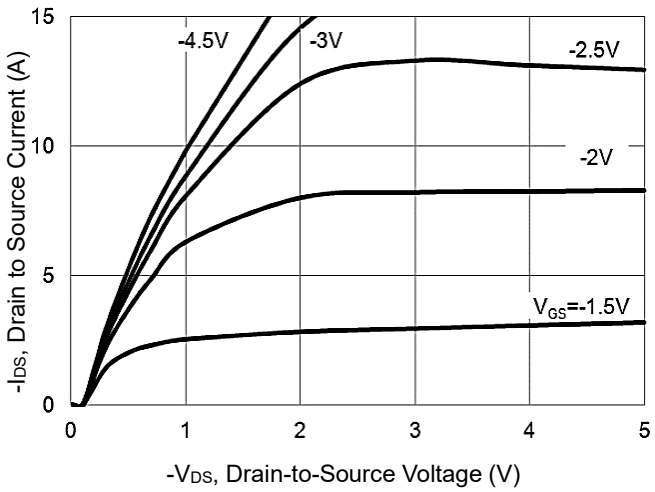


Capacitance vs. Drain-Source Voltage

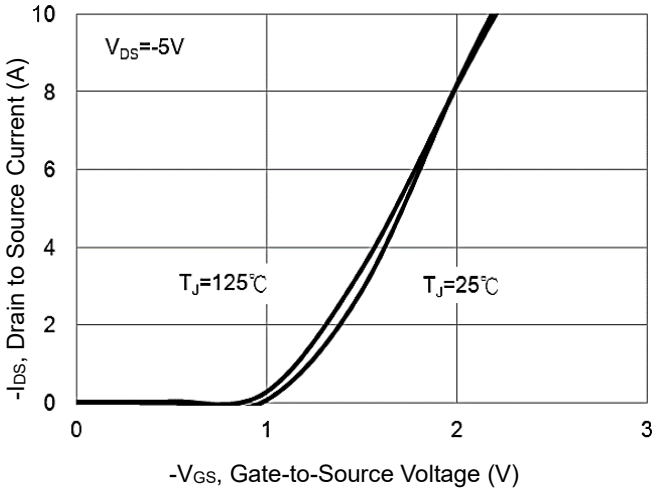


P-CH CHARACTERISTIC CURVES

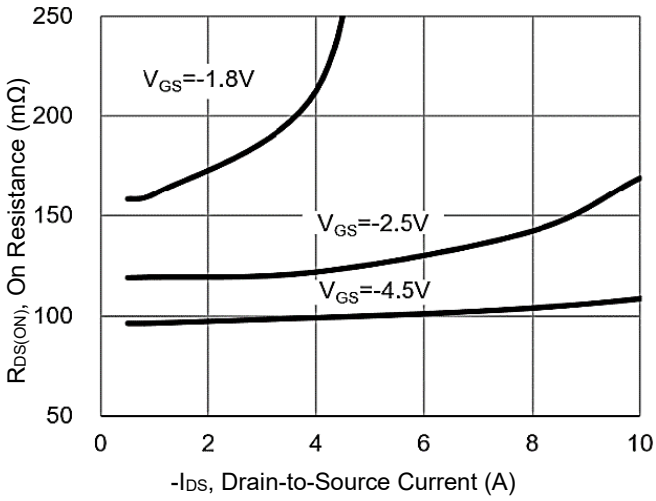
On-Region Characteristics



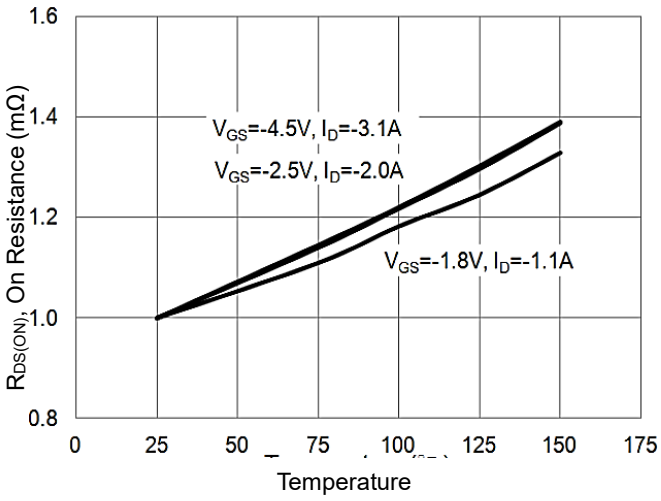
Transfer Characteristics



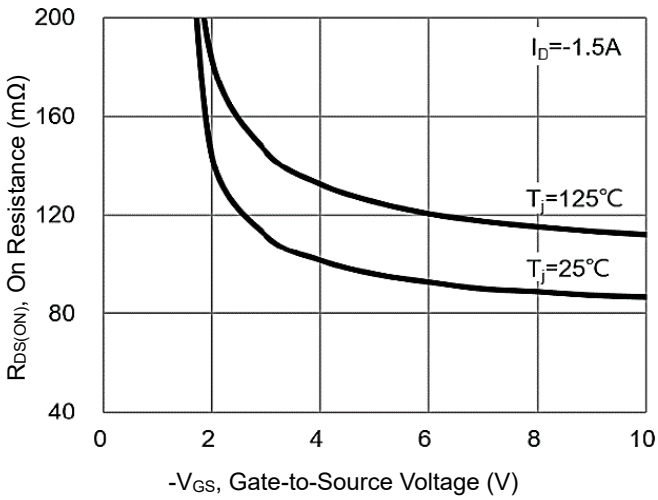
On-Resistance vs Drain Current



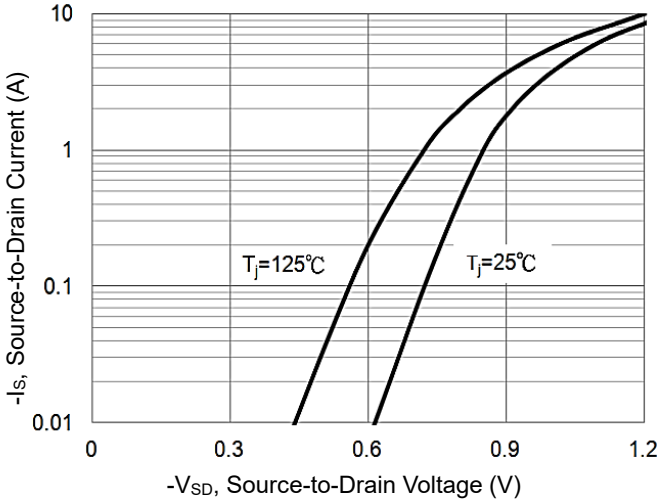
On-Resistance vs Junction Temperature



On-Resistance Variation with V_{GS}

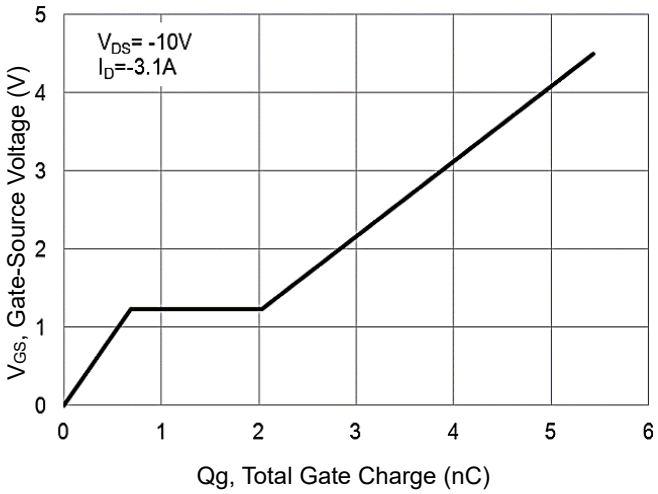


Body Diode

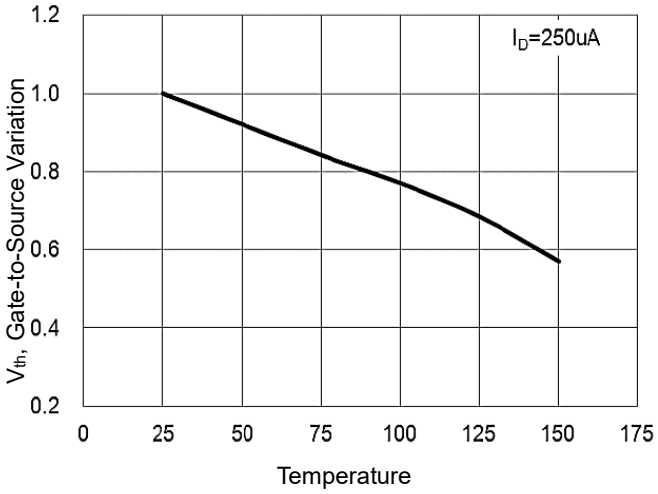


P-CH CHARACTERISTIC CURVES

Gate Charge



Threshold Voltage Variation with temperature



Capacitance vs. Drain-Source Voltage