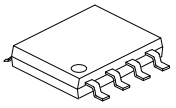
UD9930

Power MOSFET

DUAL N & P-CHANNEL POWER MOSFET



SOP-8

■ DESCRIPTION

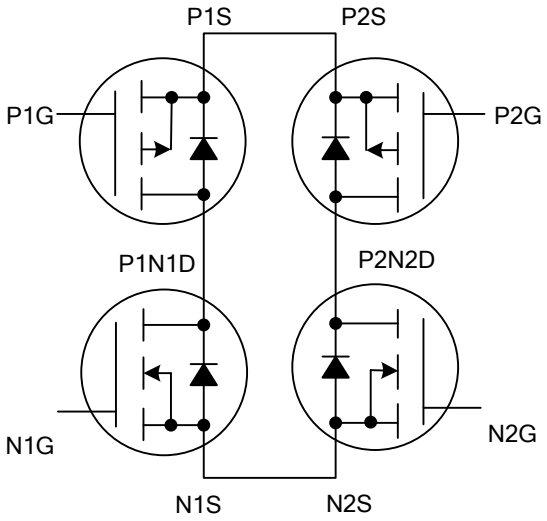
The UTC **UD9930** is a dual N & P-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on-state resistance, high switching speed, low gate chare.

The UTC **UD9930** is suitable for DC/DC converters and LCD monitor inverter.

■ FEATURES

* N-channel: $R_{DS(on)} \leq 40\ m\Omega$ @ V_{GS}=10V, I_D=5.0A
* P-channel: $R_{DS(on)} \leq 60\ m\Omega$ @ V_{GS}=-10V, I_D=-4.0A
* High switching speed
* Low gate chare

■ SYMBOL



■ ORDERING INFORMATION

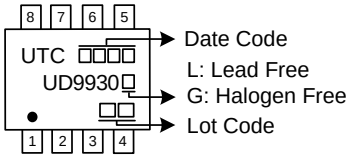
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UD9930L-S08-R	UD9930G-S08-R	SOP-8	N1G	N1D/ P1D	N1S/ N2S	N2G	P2G	N2D/ P2D	P1S/ P2S	P1G	Tape Reel

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

UD9930G-S08-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) S08: SOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING


8
7
6
5
UTC
UD9930
1
2
3
4
Date Code
L: Lead Free
G: Halogen Free
Lot Code

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

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Drain to Source Voltage			V_{DSS}	30	-30	V
Gate to Source Voltage			V_{GSS}	±25	±25	
Drain Current (Note 3)	Continuous	T_A=25°C	I_D	5.5	-4.1	A
		T_A=70°C		4.4	-3.3	
Drain Current (Note 1)	Pulsed		I_{DM}	20	-20	
Total Power Dissipation @T_A=25°C			P_D	1.38		W
Junction Temperature			T_J	-55 ~ +150		°C
Storage Temperature Range			T_{STG}	-55 ~ +150		°C

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	RATINGS	UNIT
Junction to Ambient (Note 3)	θ_{JA}	90	°C/W

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

■ N-CHANNEL ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0 V, I_D=250μA	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=30V, V_{GS}=0 V, T_J=25°C			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=25V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-25V, 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
Drain-Source On-state Resistance (Note 2)		$R_{DS(ON)}$	V_{GS}=10V, I_D=5.0A			40	mΩ
			V_{GS}=4.5V, I_D=3.0A			60	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0 V, f=1.0MHz		207		pF
Output Capacitance		C_{OSS}			105		pF
Reverse Transfer Capacitance		C_{RSS}			40		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{DS}=15V, V_{GS}=4.5V, I_D=5A		4.2		nC
Gate to Source Charge		Q_{GS}			1.5		nC
Gate to Drain Charge		Q_{GD}			1.5		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{DS}=15V, V_{GS}=10V, I_D=5A, R_G=6Ω		1.8		ns
Rise Time		t_R			15		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			10		ns
Fall-Time		t_F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage (Note 2)		V_{SD}	I_S=1.2A, V_{GS}=0V			1.2	V

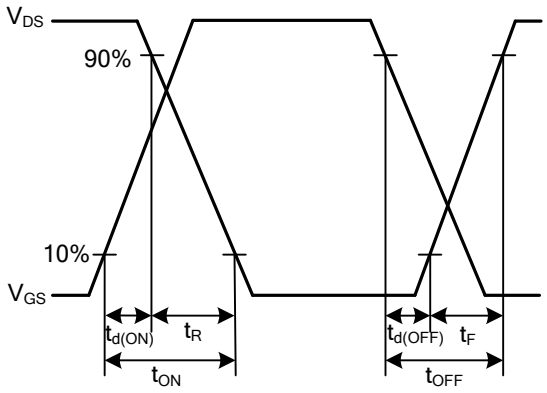
■ P-CHANNEL ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0 V, I_D=-250μA	-30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-30V, V_{GS}=0 V, T_J=25°C			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=25V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-25V, 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
Drain-Source On-state Resistance (Note 2)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-4.0A			60	mΩ
			V_{GS}=-4.5V, I_D=-2.0A			100	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0 V, f=1.0MHz		590		pF
Output Capacitance		C_{OSS}			145		pF
Reverse Transfer Capacitance		C_{RSS}			100		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{DS}=-15V, V_{GS}=-4.5V, I_D=-5A		9.5		nC
Gate to Source Charge		Q_{GS}			2		nC
Gate to Drain Charge		Q_{GD}			4.2		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{DS}=-15V, V_{GS}=-10V, I_D=-5A, R_G=6Ω		4		ns
Rise Time		t_R			18		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			28		ns
Fall-Time		t_F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage (Note 2)		V_{SD}	I_S=-1.2A, V_{GS}=0V			-1.2	V

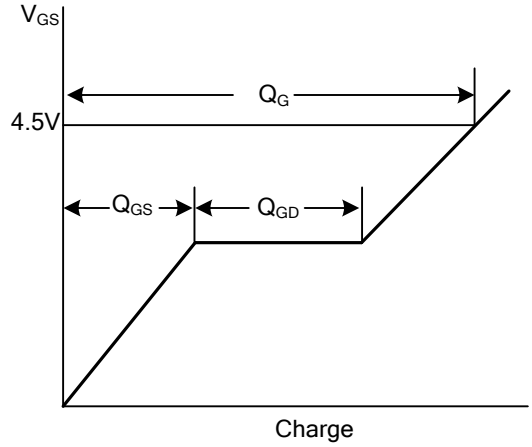
Notes: 1. Pulse width limited by Max. Junction temperature
2. Pulse width ≤ 300us, duty cycle ≤ 2%
3. Surface mounted on 1 in^2 copper pad of FR4 board, t ≤10sec; 186℃/W when mounted on Min. copper pad

■ TEST CIRCUITS AND WAVEFORMS

N-Channel

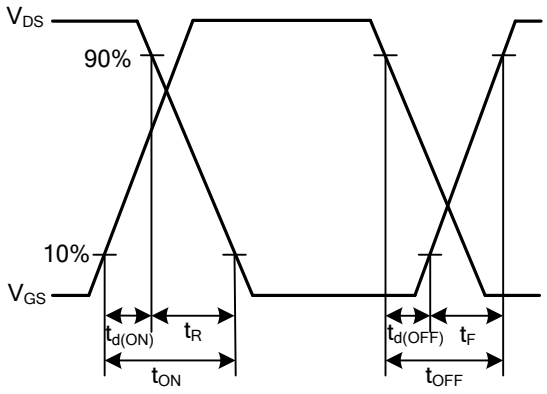


Resistive Switching Waveforms

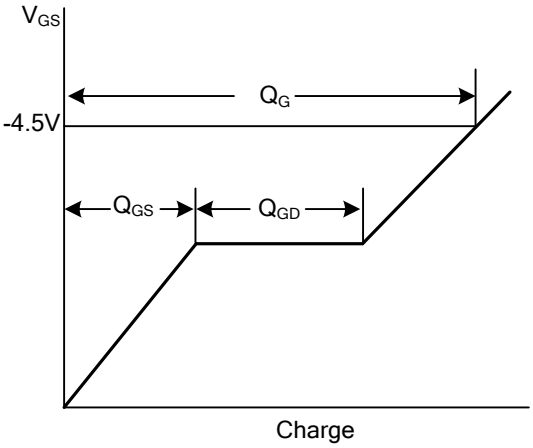


Gate Charge Waveforms

P-Channel



Resistive Switching Waveforms

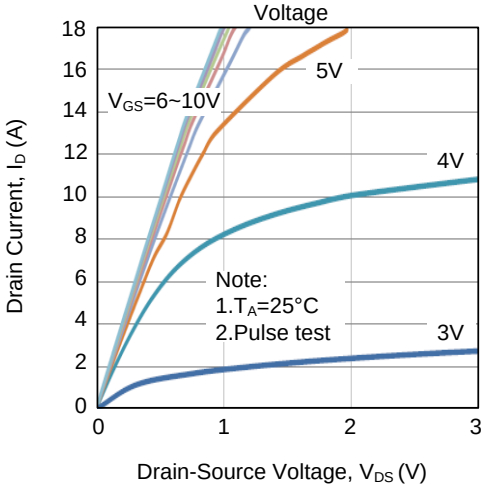


Gate Charge Waveforms

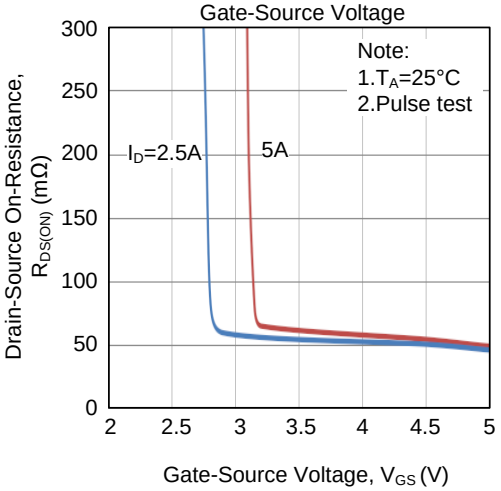
■ TYPICAL CHARACTERISTICS

N-CHANNEL

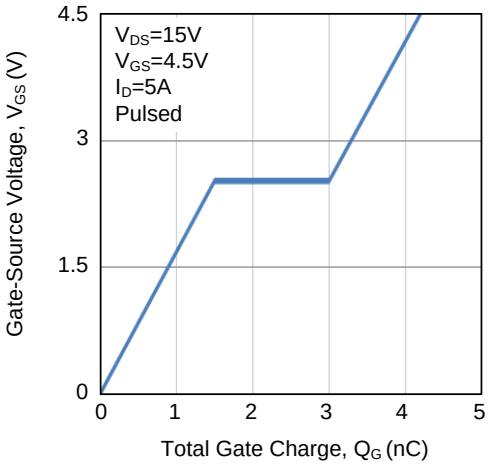
Drain Current vs. Drain-Source Voltage



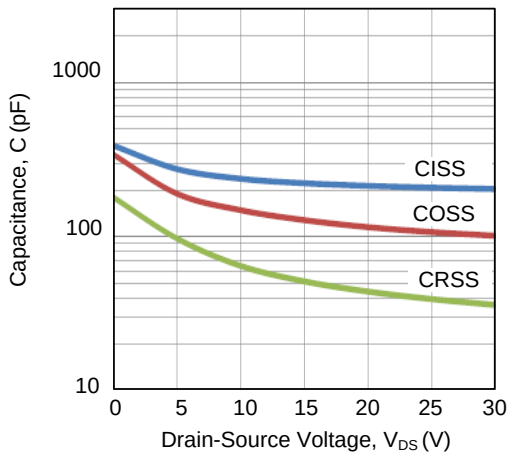
Drain-Source On-Resistance vs. Gate-Source Voltage



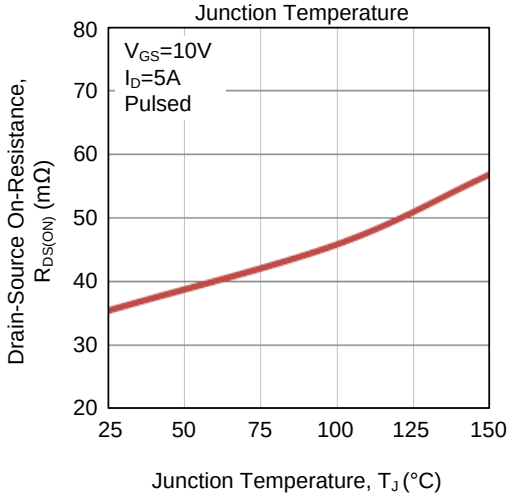
Gate Charge Characteristics



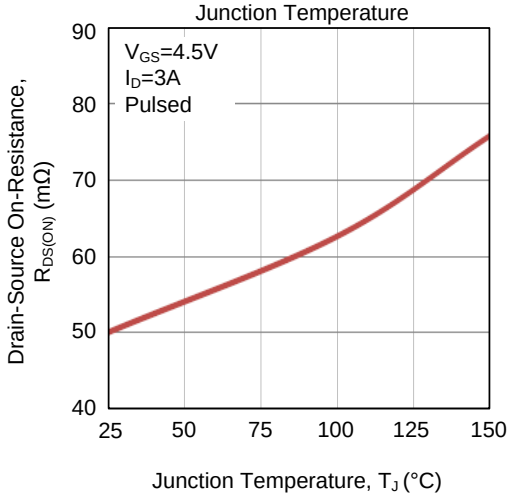
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature



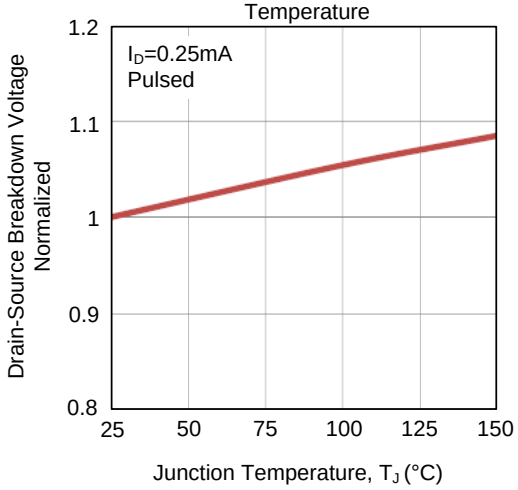
Drain-Source On-Resistance vs. Junction Temperature



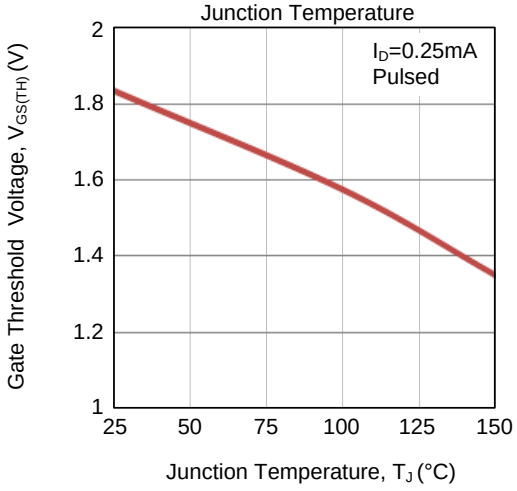
■ TYPICAL CHARACTERISTICS (Cont.)

N-CHANNEL

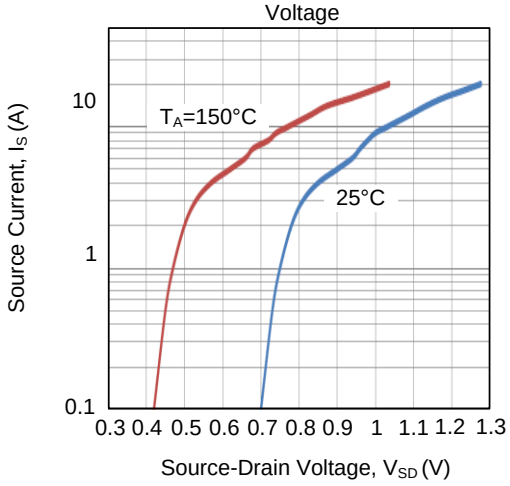
Breakdown Voltage vs. Junction Temperature



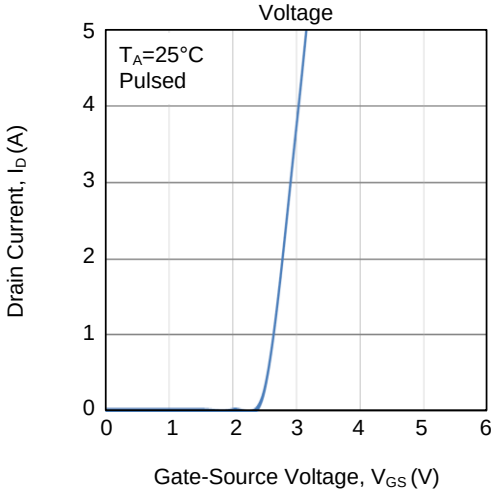
Gate Threshold Voltage vs. Junction Temperature



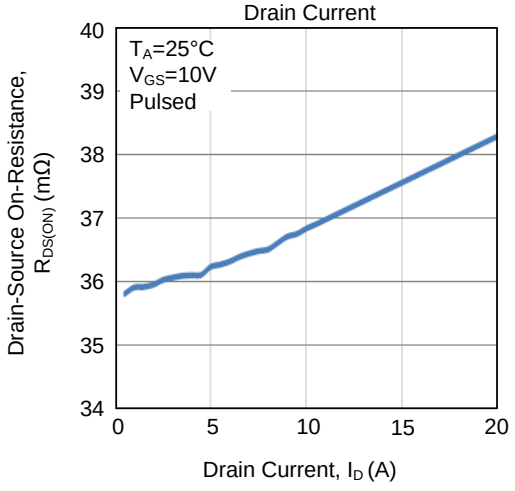
Source Current vs. Source-Drain Voltage



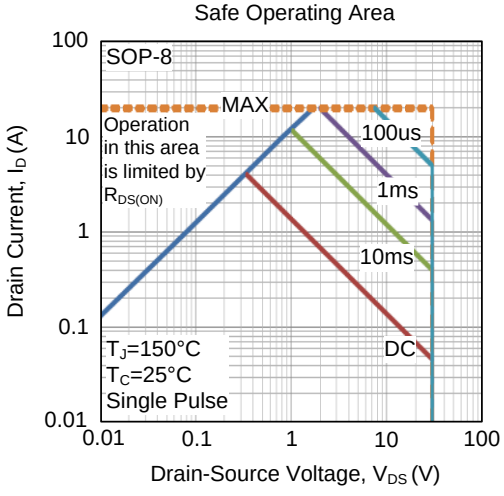
Drain Current vs. Gate-Source Voltage



Drain-Source On-Resistance vs. Drain Current



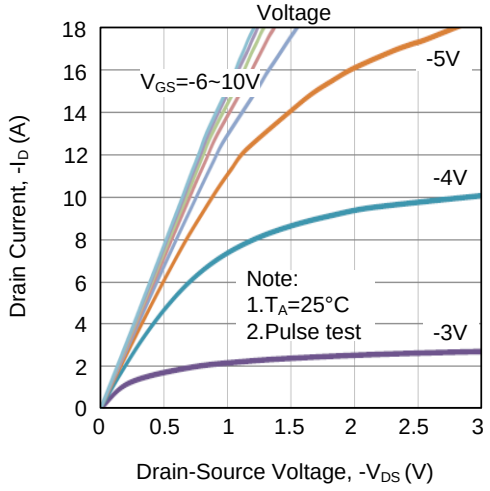
Safe Operating Area



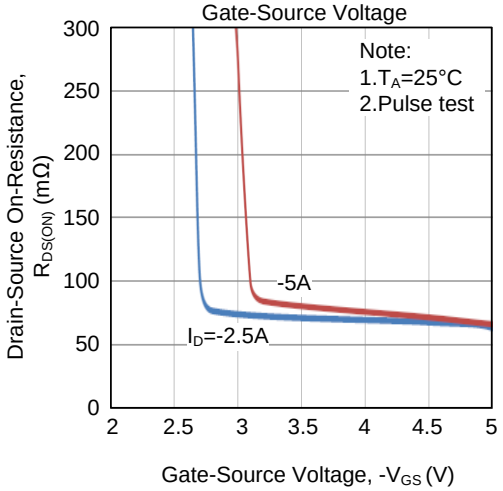
■ TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL

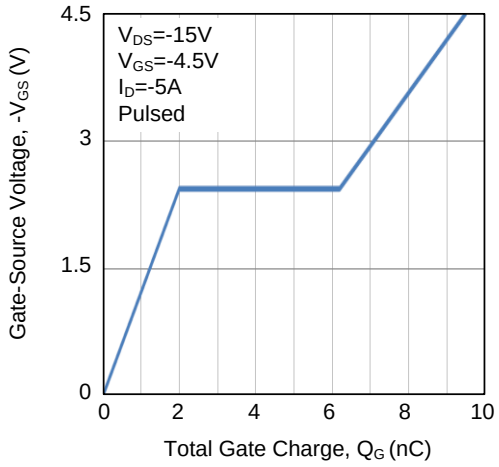
Drain Current vs. Drain-Source Voltage



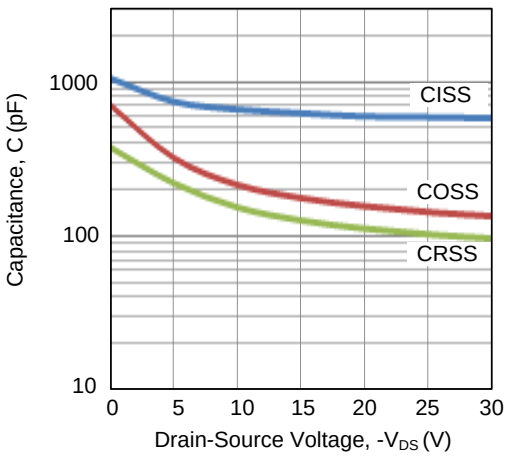
Drain-Source On-Resistance vs. Gate-Source Voltage



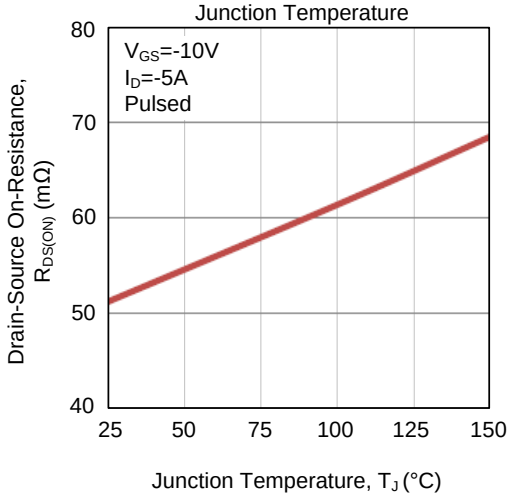
Gate Charge Characteristics



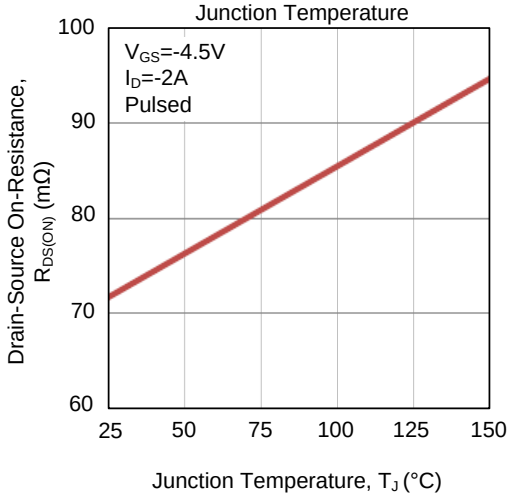
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature



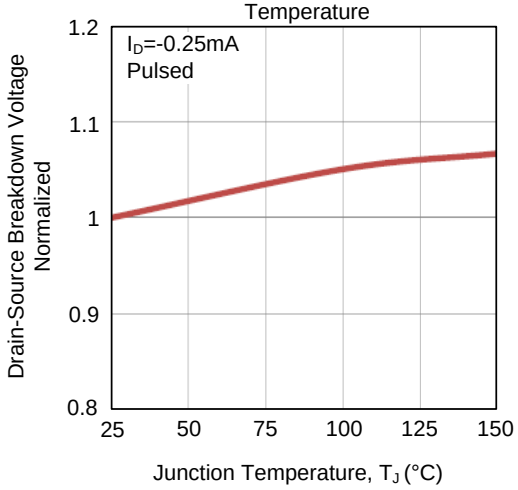
Drain-Source On-Resistance vs. Junction Temperature



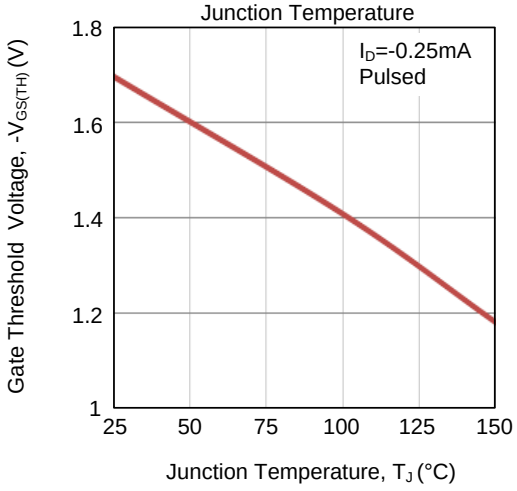
■ TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL

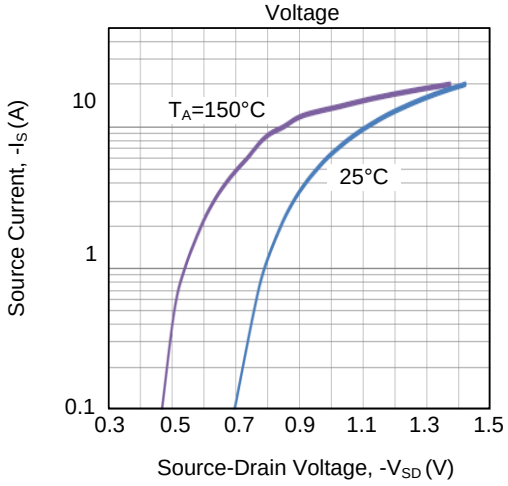
Breakdown Voltage vs. Junction Temperature



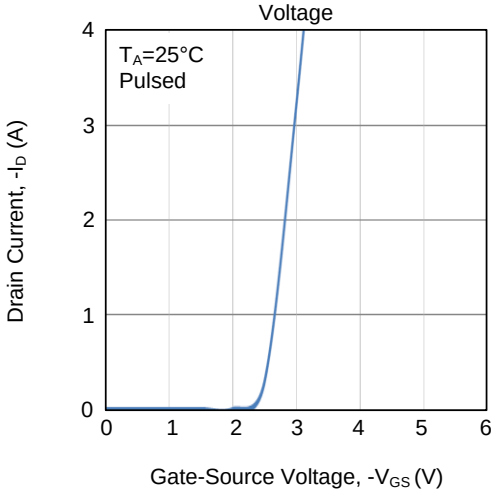
Gate Threshold Voltage vs. Junction Temperature



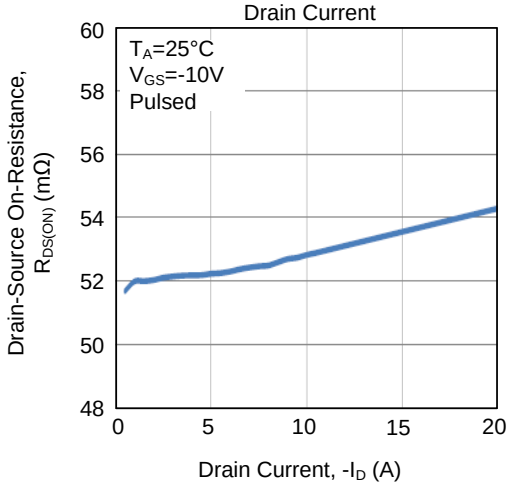
Source Current vs. Source-Drain Voltage



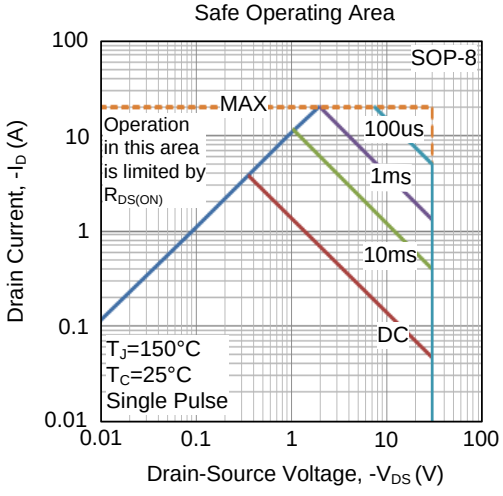
Drain Current vs. Gate-Source Voltage



Drain-Source On-Resistance vs. Drain Current



Safe Operating Area



■ TYPICAL CHARACTERISTICS (Cont.)