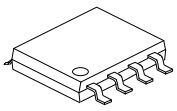
UT24NN04

Power MOSFET

24A, 40V DUAL N-CHANNEL ENHANCEMENT MODE POWER MOSFET



SOP-8

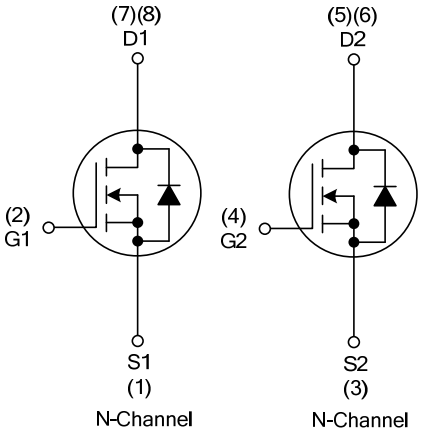
■ DESCRIPTION

The UTC **UT24NN04** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low Rdson characteristic by high cell density trench technology.

■ FEATURES

* $R_{DS(ON)}$ ≤ 15 mΩ @ V_{GS}=10V, I_D=12A
  $R_{DS(ON)}$ ≤ 20 mΩ @ V_{GS}=4.5V, I_D=12A
* Fast Switching Speed
* Simple Drive Requirement

■ SYMBOL



■ ORDERING INFORMATION

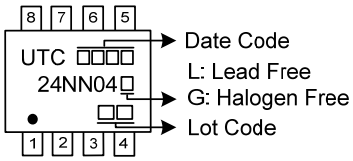
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	15	
UT24NN04L-S08-R	UT24NN04G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UT24NN04G-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 □□□□
24NN04□
□□
1 2 3 4
Date Code
L: Lead Free
G: Halogen Free
Lot Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	24	A
	Pulsed (Note 2)	I_{DM}	48	A
Single Pulse Avalanche Energy		E_{AS}	11	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	7.8	V/ns
Power Dissipation (T_C=25°C)		P_D	2	W
Junction Temperature		T_J	+150	°C
Storage Temperature		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=0.1mH, I_{AS}=15A, V_{DD}=30V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤24A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	125	°C/W
Junction to Case	θ_{JC}	60	°C/W

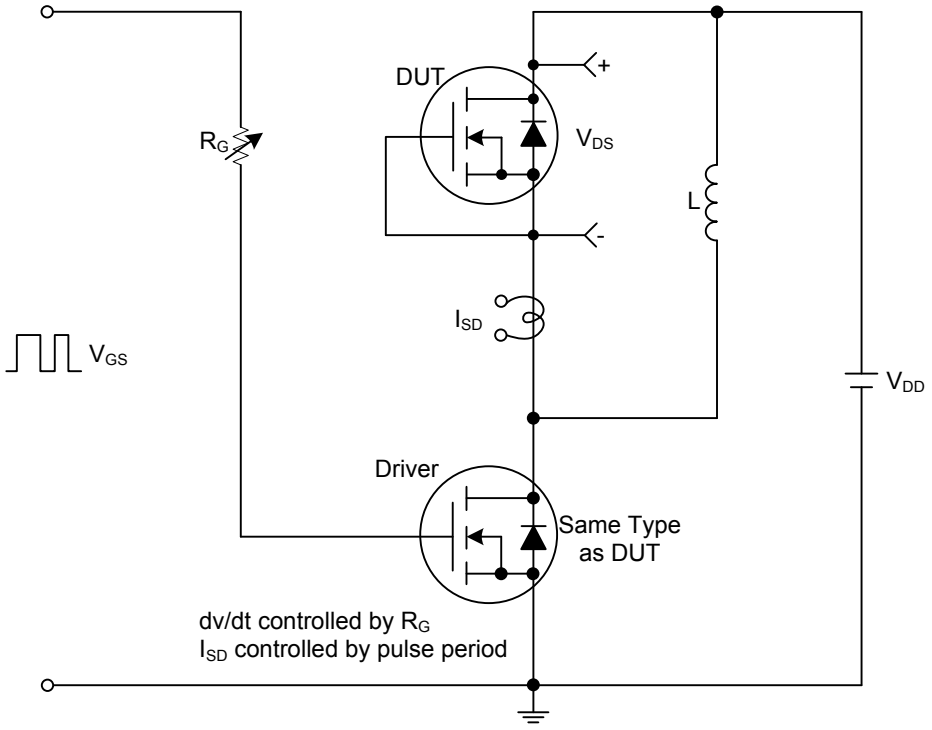
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

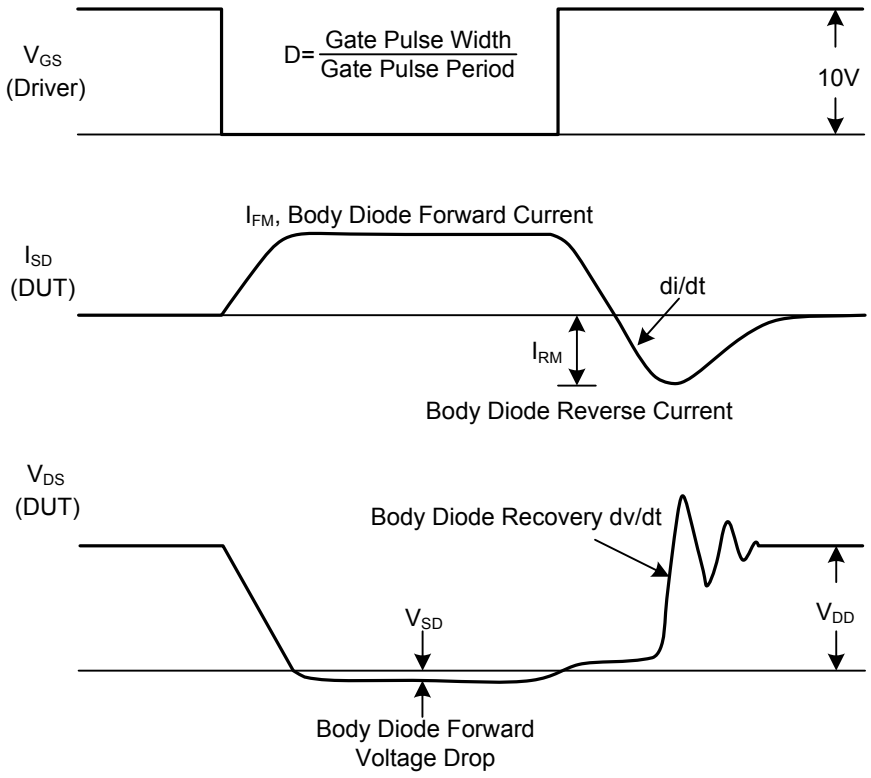
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V ,V_{GS}=20V			60	nA
	Reverse		V_{DS}=0V ,V_{GS}=-20V			-60	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		$R_{DS(ON)}$	V_{GS}=10V, I_D=12A			15	mΩ
			V_{GS}=4.5V, I_D=12A			20	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		1260		pF
Output Capacitance		C_{OSS}			140		pF
Reverse Transfer Capacitance		C_{RSS}			125		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=32V, V_{GS}=10V, I_D=24A (Note 1, 2)		42		nC
Gate-Source Charge		Q_{GS}			5.5		nC
Gate-Drain Charge		Q_{GD}			13		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=20V, V_{GS}=10V, I_D=24A, R_G=3Ω (Note 1, 2)		8		ns
Turn-ON Rise Time		t_R			17		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			32		ns
Turn-OFF Fall Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				24	A
Maximum Body-Diode Pulsed Current		I_{SM}				48	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S =24A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=24A, V_{GS}=0V, dI_F/dt =100A/μs		33		nS
Reverse Recovery Charge		Q_{rr}			19		nC

Notes: 1. Pulse Test: Pulse width ≤ 600μs, Duty cycle≤2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



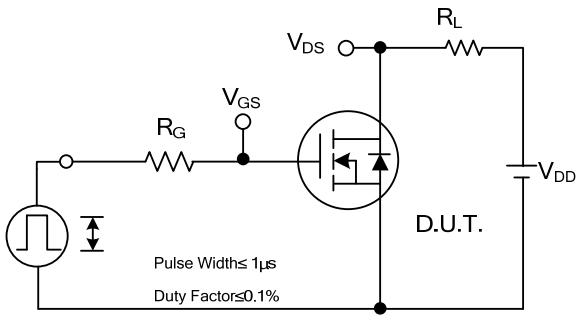
Peak Diode Recovery dv/dt Test Circuit



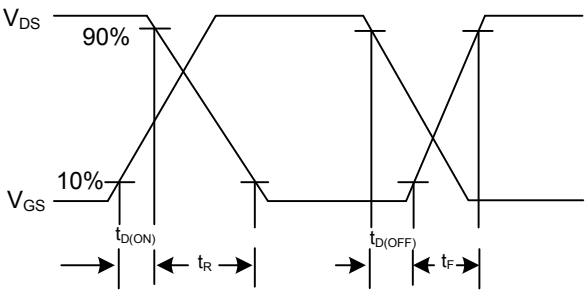
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

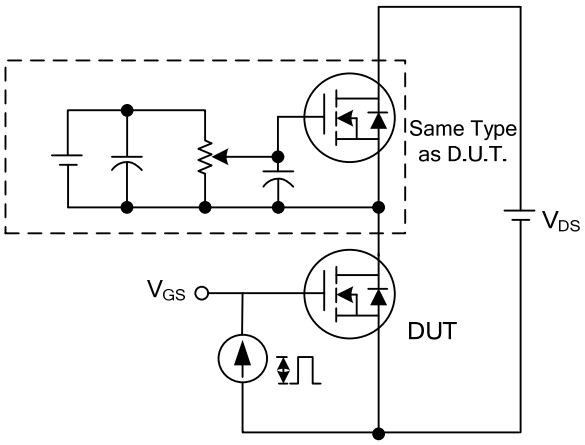
■ TEST CIRCUITS AND WAVEFORMS



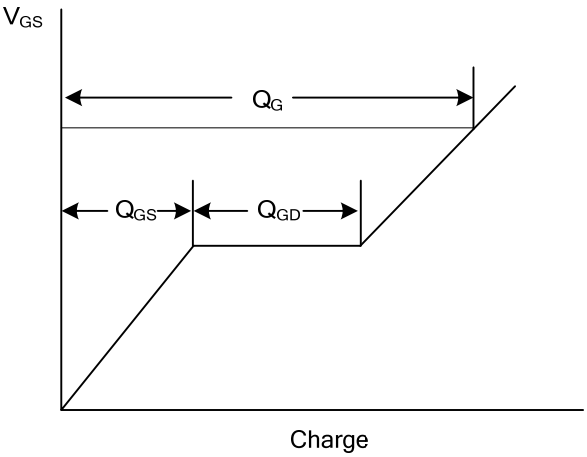
Switching Test Circuit



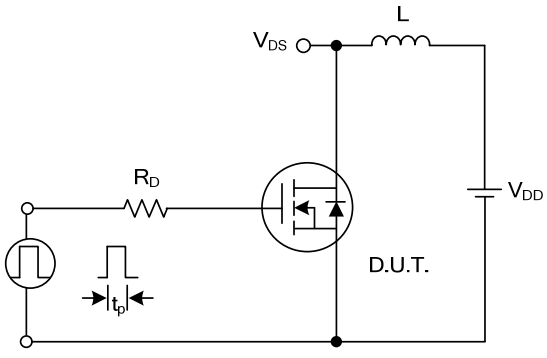
Switching Waveforms



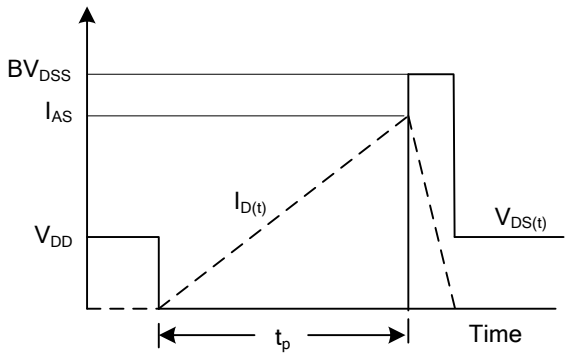
Gate Charge Test Circuit



Gate Charge Waveform



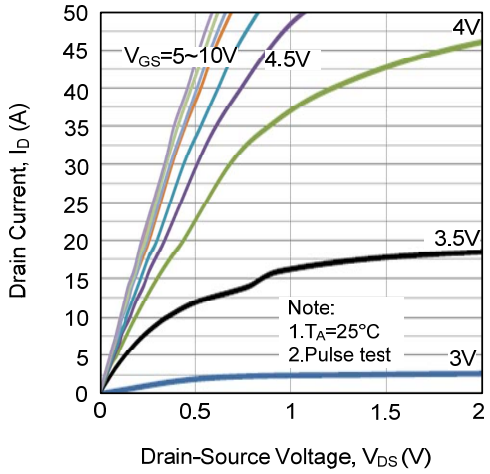
Unclamped Inductive Switching Test Circuit



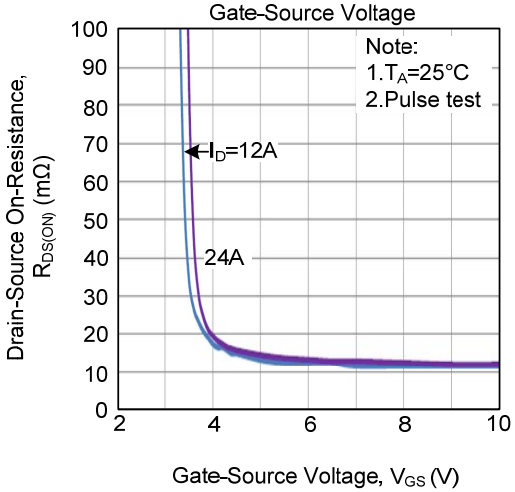
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

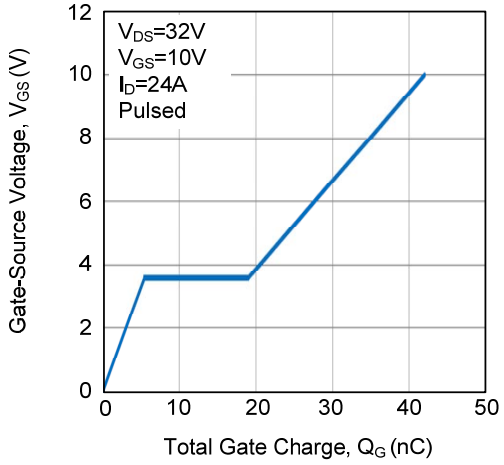
Drain Current vs. Drain-Source Voltage



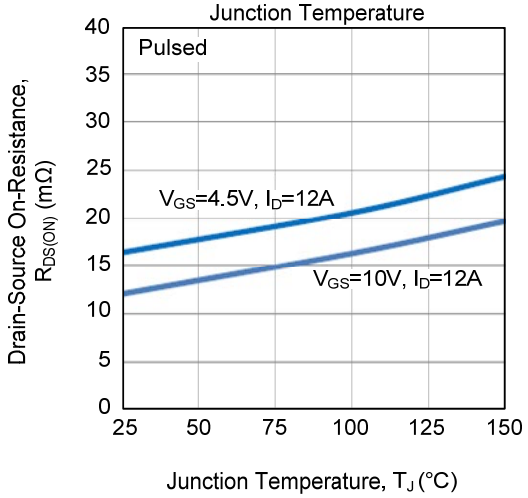
Drain-Source On-Resistance vs. Gate-Source Voltage



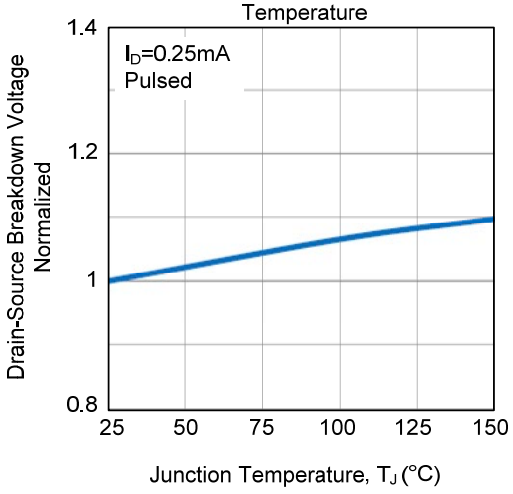
Gate Charge Characteristics



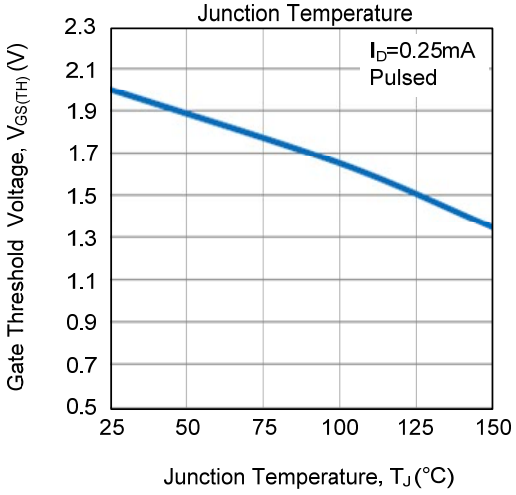
Drain-Source On-Resistance vs. Junction Temperature



Breakdown Voltage vs. Junction Temperature

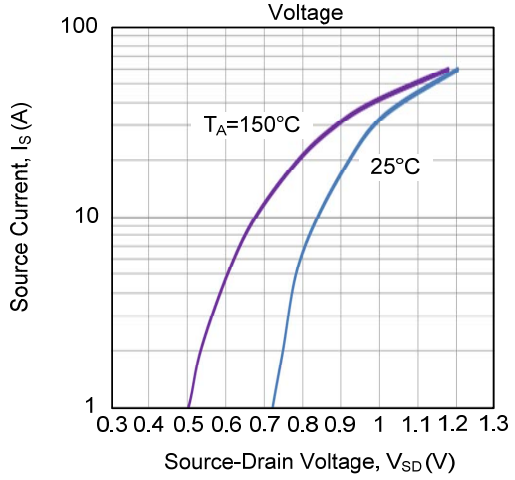


Gate Threshold Voltage vs. Junction Temperature

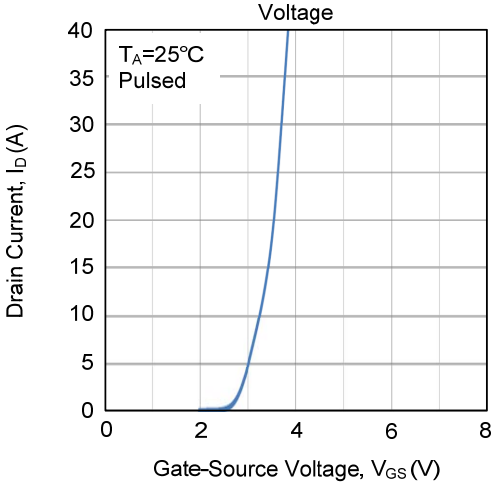


■ TYPICAL CHARACTERISTICS (Cont.)

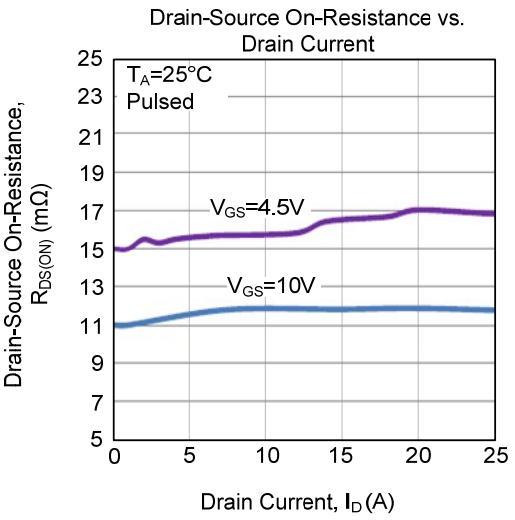
Source Current vs. Source-Drain Voltage



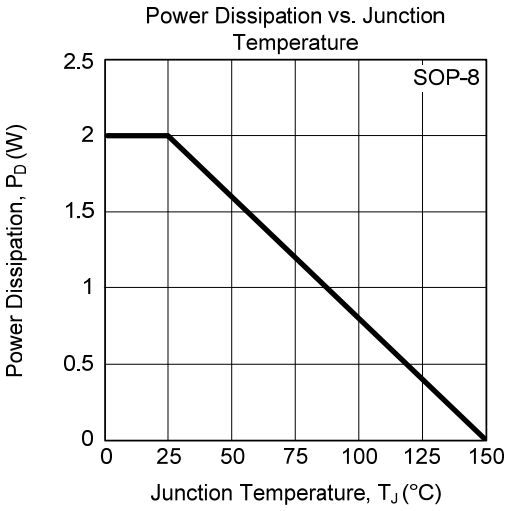
Drain Current vs. Gate-Source Voltage



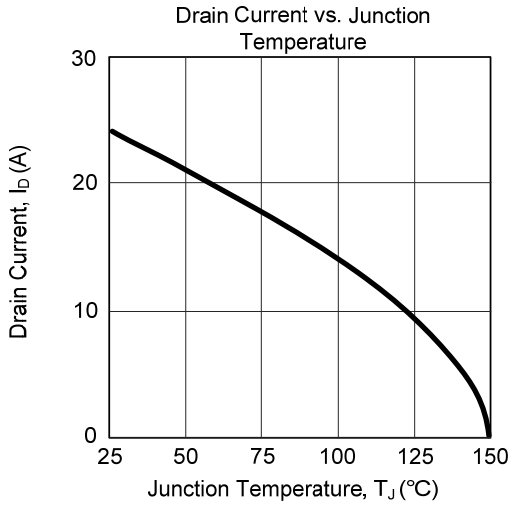
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



Safe Operating Area