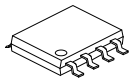
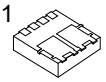
UT20NN04

Power MOSFET

20A, 40V DUAL N-CHANNEL ENHANCEMENT MODE POWER MOSFET



SOP-8



PDFN3×3

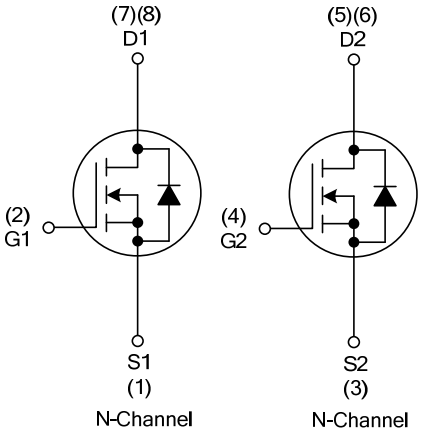
■ DESCRIPTION

The UTC **UT20NN04** 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

* $R_{DS(ON)} \leq 20\ m\Omega$ @ V_{GS}=10V, I_D=10A
  $R_{DS(ON)} \leq 32\ m\Omega$ @ V_{GS}=4.5V, I_D=10A
* Fast Switching Speed
* Simple Drive Requirement

■ SYMBOL



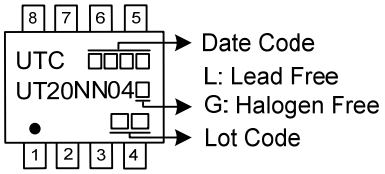
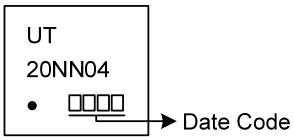
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT20NN04L-S08-R	UT20NN04G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UT20NN04L-P3030-R	UT20NN04G-P3030-R	PDFN3×3	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UT20NN04G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8, P3030: PDFN3×3 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

SOP-8	PDFN3×3
	

■ 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	20	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	4	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2	V/nS
Power Dissipation	SOP-8	P_D	1.7	W
	PDFN3×3		25	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} = 9.2A, V_{DD} = 25V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 20A, di/dt ≤ 200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-8	θ_{JA}	125	°C/W
	PDFN3×3		75	°C/W
Junction to Case	SOP-8	θ_{JC}	73.5	°C/W
	PDFN3×3		5	°C/W

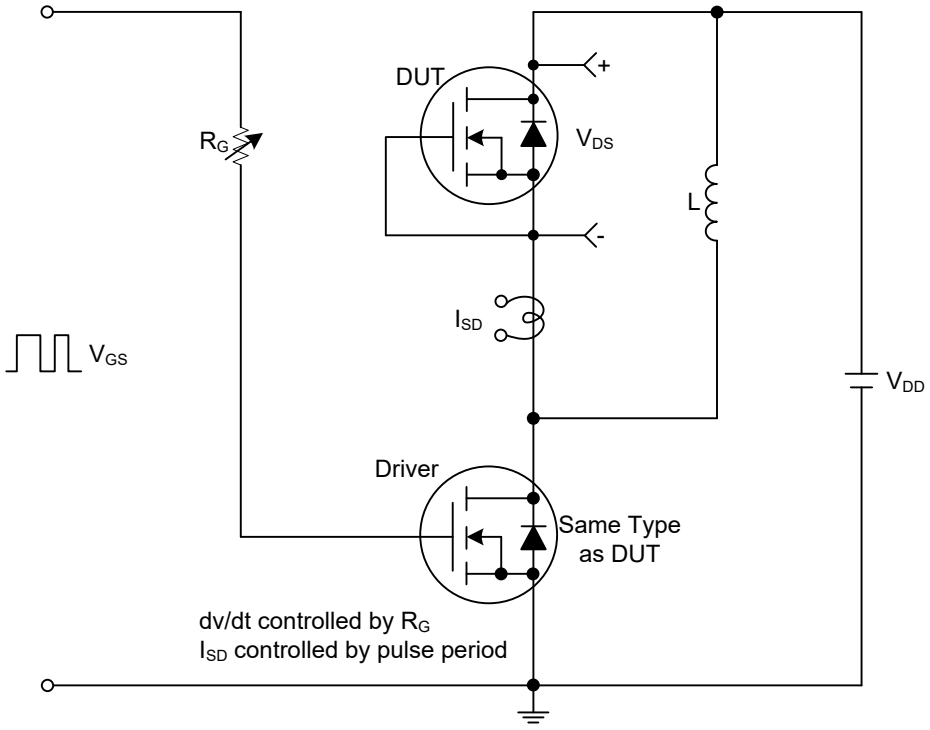
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

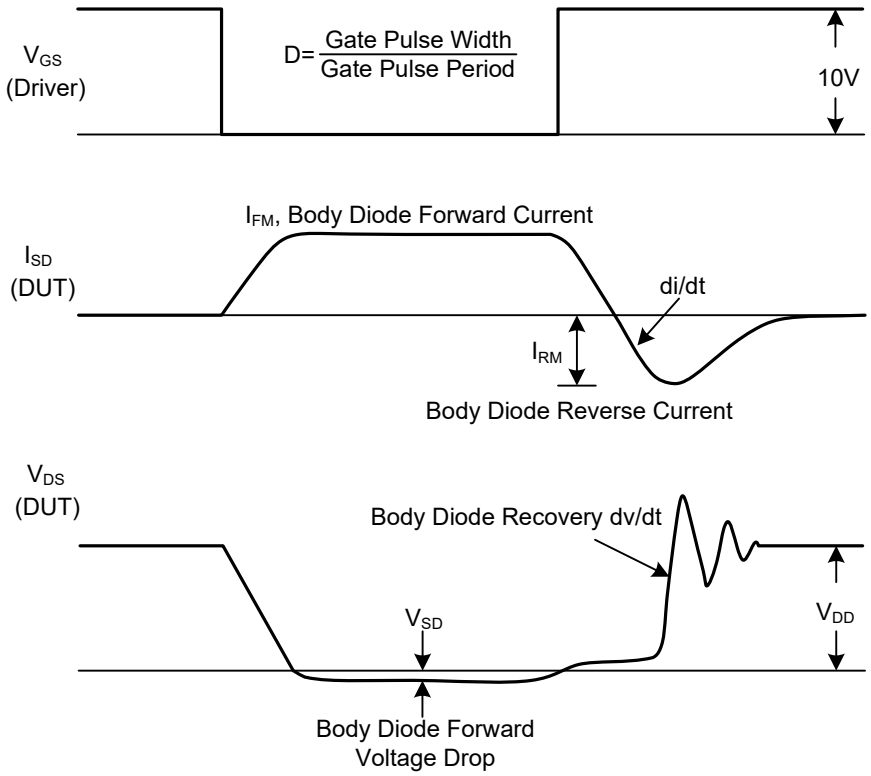
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V ,V_{GS}=20V			100	nA
	Reverse		V_{DS}=0V ,V_{GS}=-20V			-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		$R_{DS(ON)}$	V_{GS}=10V, I_D=10A			20	mΩ
			V_{GS}=4.5V, I_D=10A			32	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		715		pF
Output Capacitance		C_{OSS}			116		pF
Reverse Transfer Capacitance		C_{RSS}			84		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=32V, V_{GS}=10V, I_D=20A, I_G=1mA (Note 1, 2)		26		nC
Gate-Source Charge		Q_{GS}			6		nC
Gate-Drain Charge		Q_{GD}			5		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=20V, V_{GS}=10V, I_D=20A, R_G=3Ω (Note 1, 2)		5		ns
Turn-ON Rise Time		t_R			16		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			21		ns
Turn-OFF Fall Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				20	A
Maximum Body-Diode Pulsed Current		I_{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S =20A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S =20A, V_{GS}=0V, dI_F/dt=100A/μs		38		ns
Body Diode Reverse Recovery Charge		Q_{rr}			22		nC

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

■ TEST CIRCUITS AND WAVEFORMS



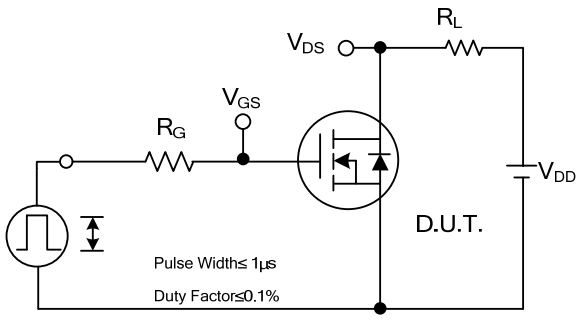
Peak Diode Recovery dv/dt Test Circuit



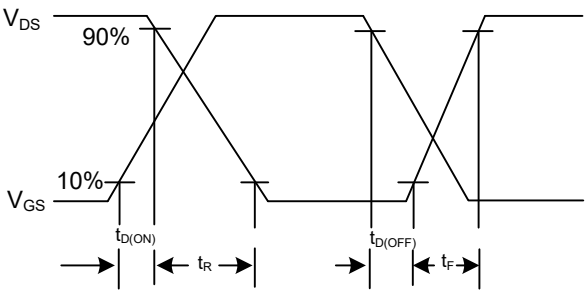
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

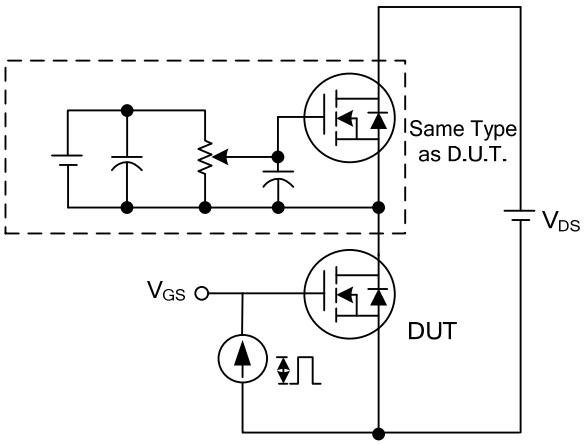
■ TEST CIRCUITS AND WAVEFORMS



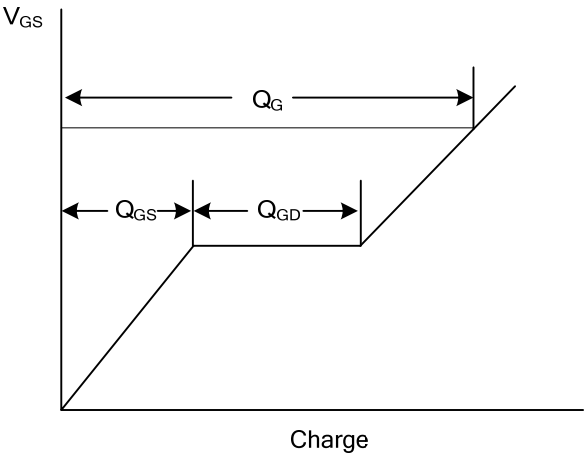
Switching Test Circuit



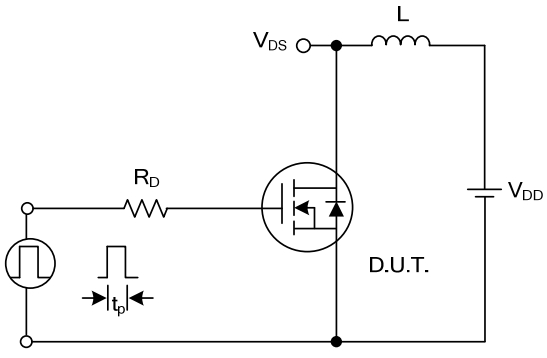
Switching Waveforms



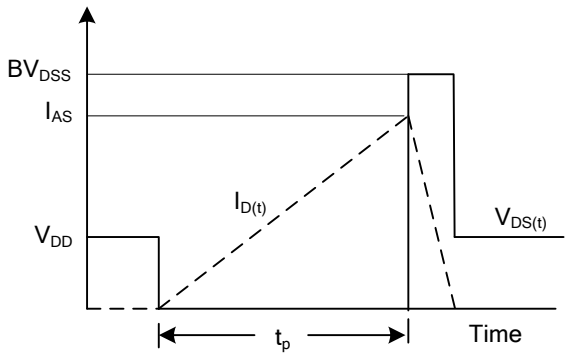
Gate Charge Test Circuit



Gate Charge Waveform



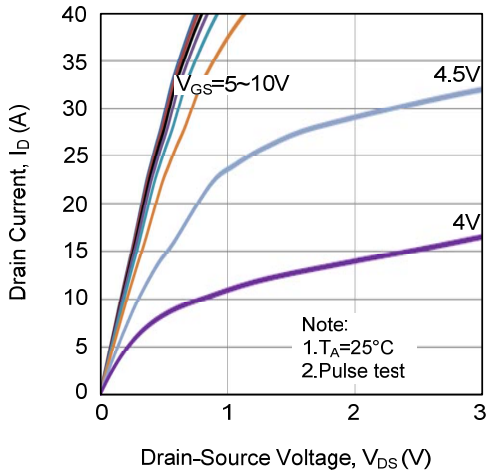
Unclamped Inductive Switching Test Circuit



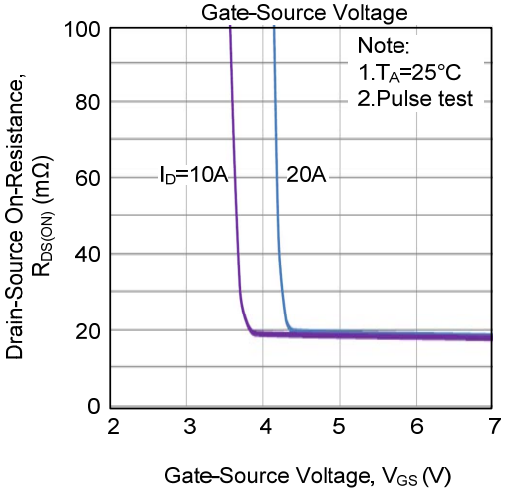
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

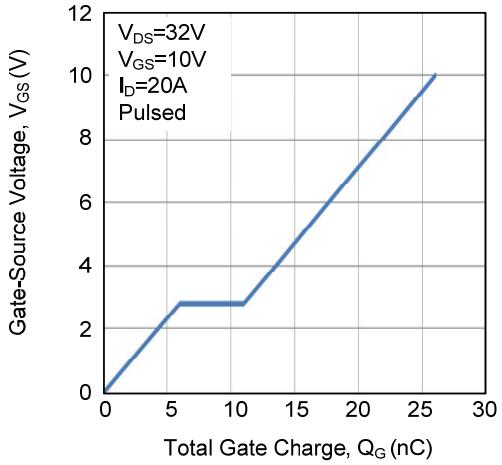
Drain Current vs. Drain-Source Voltage



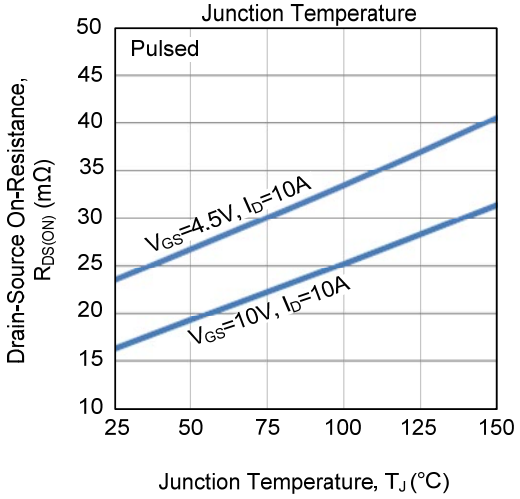
Drain-Source On-Resistance vs. Gate-Source Voltage



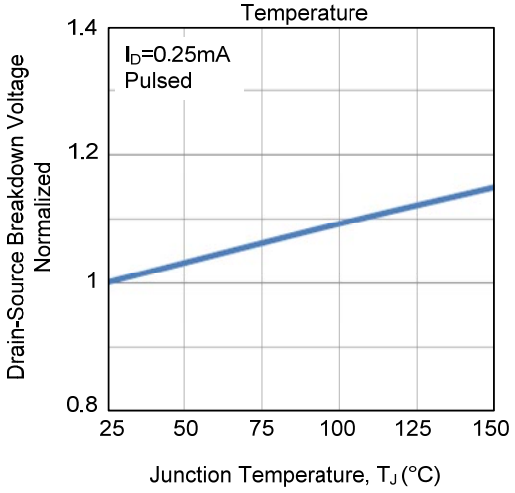
Gate Charge Characteristics



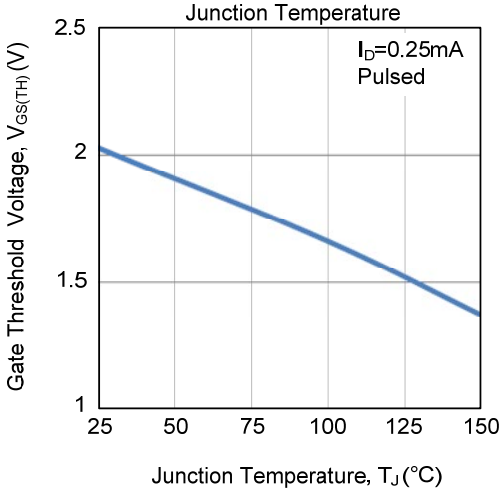
Drain-Source On-Resistance vs. Junction Temperature



Breakdown Voltage vs. Junction Temperature

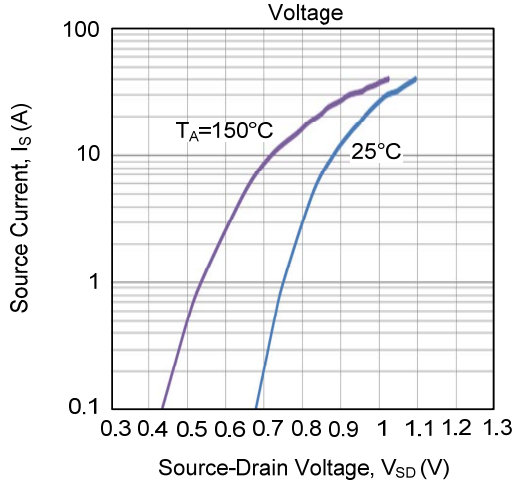


Gate Threshold Voltage vs. Junction Temperature

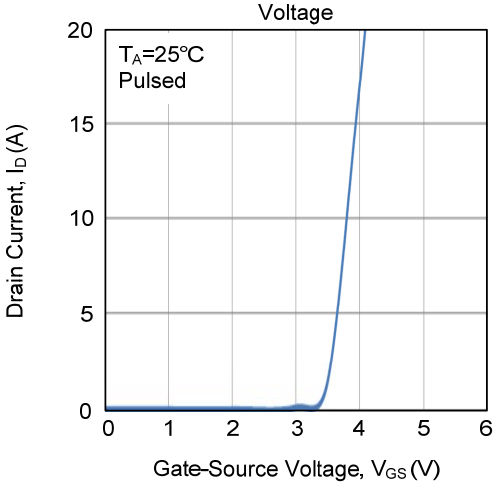


■ TYPICAL CHARACTERISTICS (Cont.)

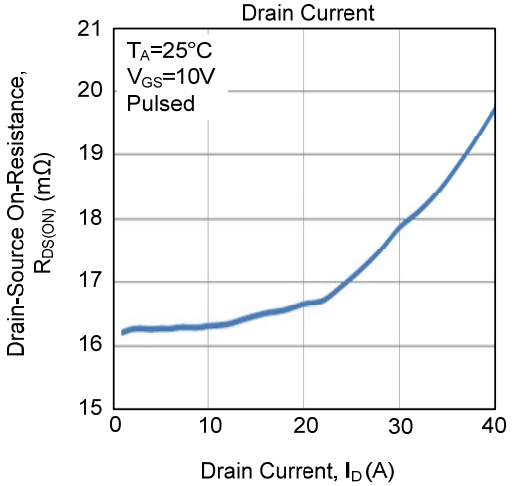
Source Current vs. Source-Drain Voltage



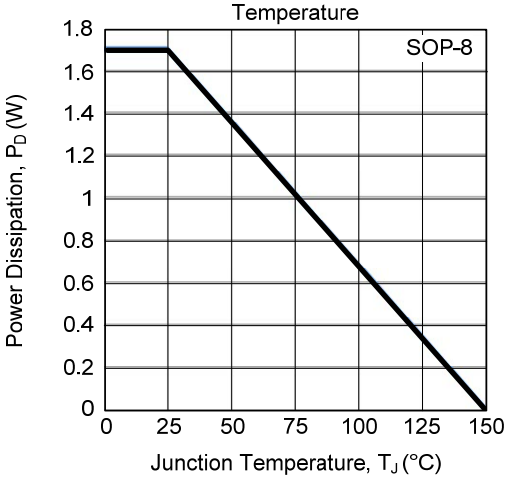
Drain Current vs. Gate-Source Voltage



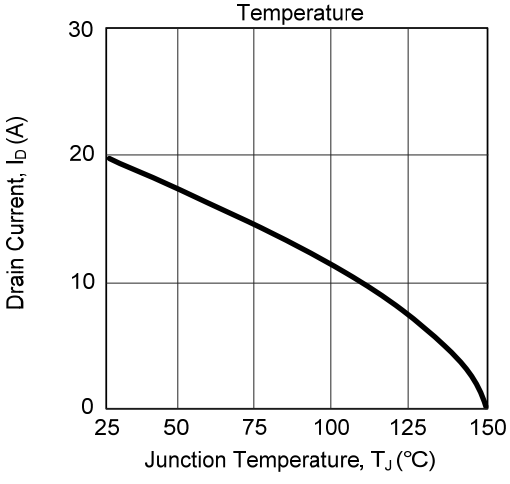
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



Safe Operating Area