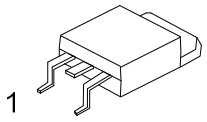
40NM50

Power MOSFET

40A, 500V N-CHANNEL SUPER-JUNCTION MOSFET



TO-263

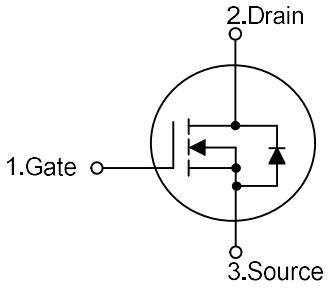
■ DESCRIPTION

The **UTC 40NM50** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

* $R_{DS(ON)} \leq 90\ m\Omega$ @ $V_{GS} = 10V$, $I_D = 15A$
* High Switching Speed
* 100% Avalanche Tested

■ SYMBOL



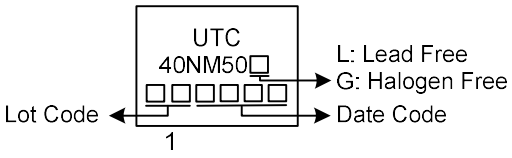
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
40NM50L-TQ2-T	40NM50G-TQ2-T	TO-263	G	D	S	Tube
40NM50L-TQ2-R	40NM50G-TQ2-R	TO-263	G	D	S	Tape Reel

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

40NM50G-TQ2-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	40	A
	Pulsed (Note 2)	I_{DM}	90	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1242	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	8.2	V/nS
Power Dissipation		P_D	190	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 = 60 mH, I_{AS} = 6.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

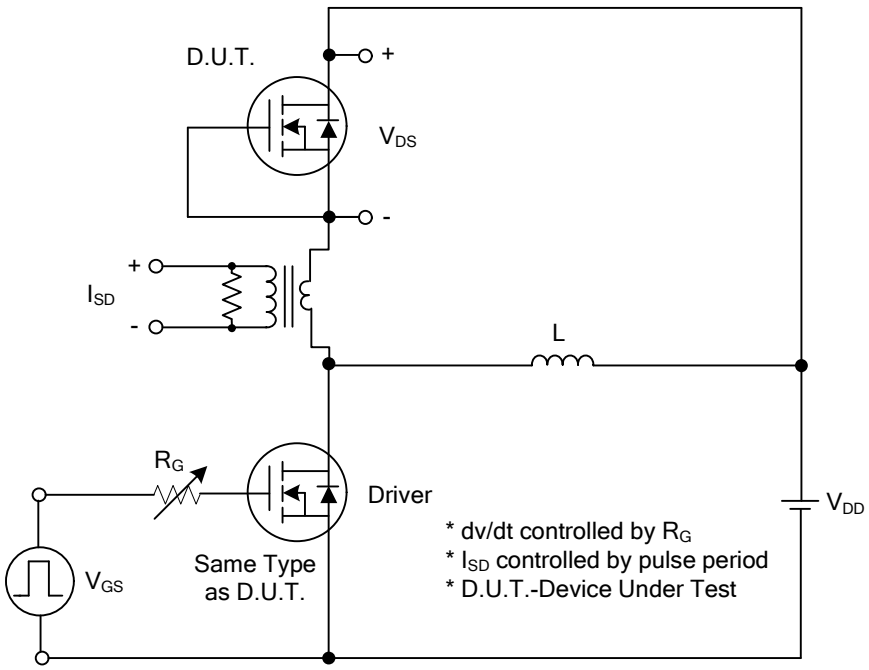
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	0.65	°C/W

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

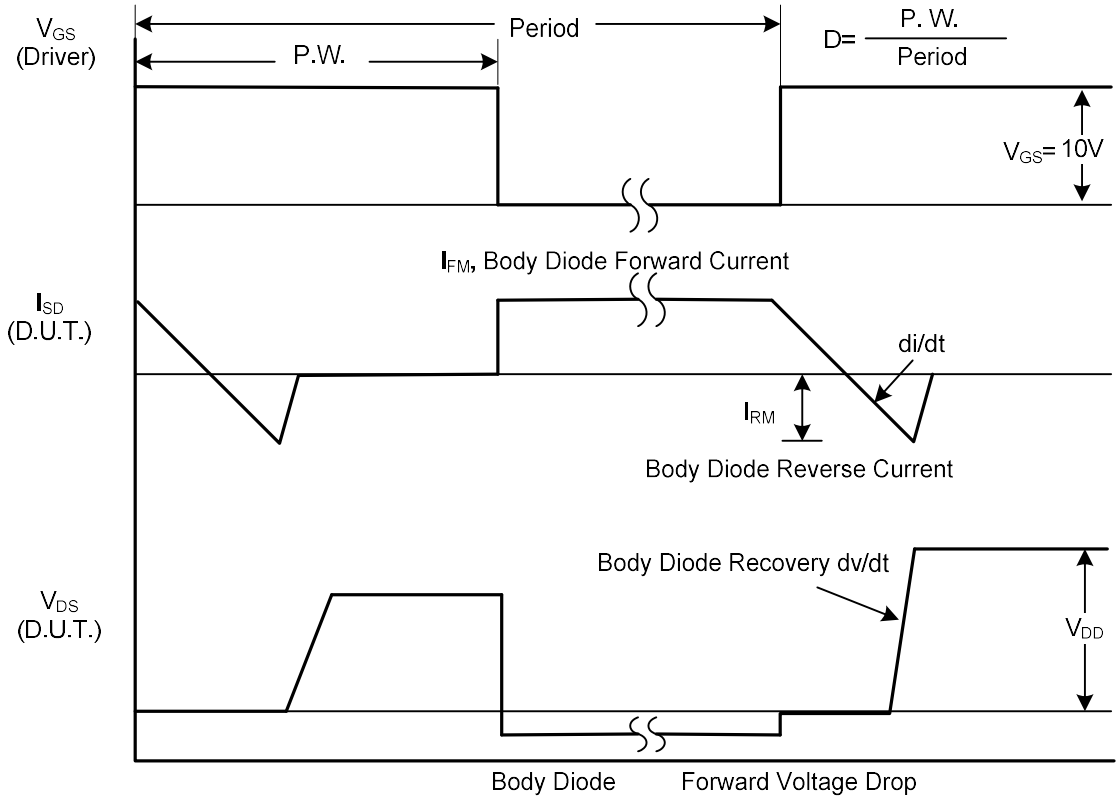
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=15A			90	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		2500		pF
Output Capacitance		C_{OSS}			2225		pF
Reverse Transfer Capacitance		C_{RSS}			303		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=30A (Note1, 2)		106		nC
Gate to Source Charge		Q_{GS}			21		nC
Gate to Drain Charge		Q_{GD}			46		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=30A, R_G=25Ω (Note1, 2)		30		ns
Rise Time		t_R			67		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			340		ns
Fall-Time		t_F			93		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				40	A
Maximum Body-Diode Pulsed Current		I_{SM}				90	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=30A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt=100A/μs		505		ns
Body Diode Reverse Recovery Charge		Q_{rr}			9.7		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



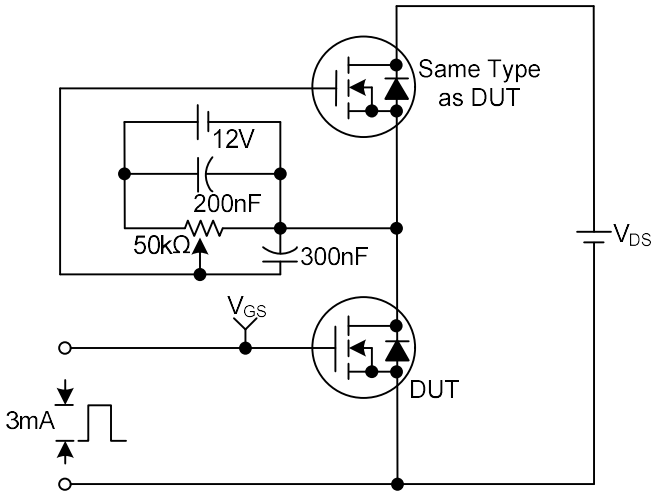
Peak Diode Recovery dv/dt Test Circuit



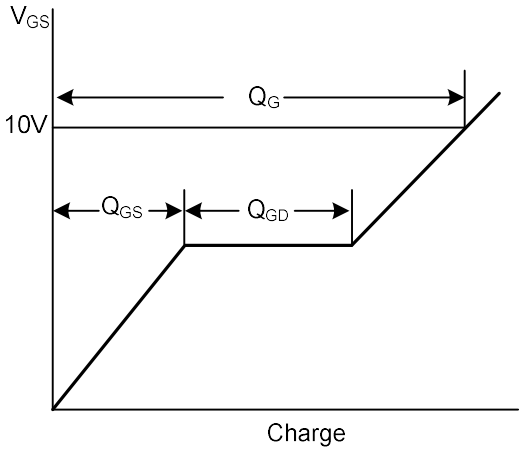
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

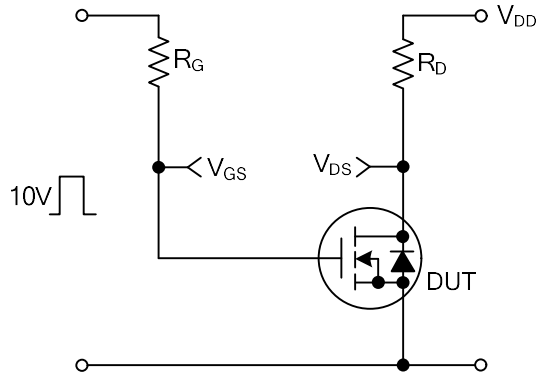
Gate Charge Test Circuit



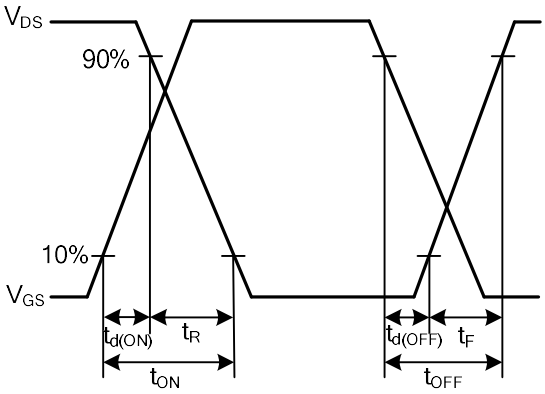
Gate Charge Waveforms



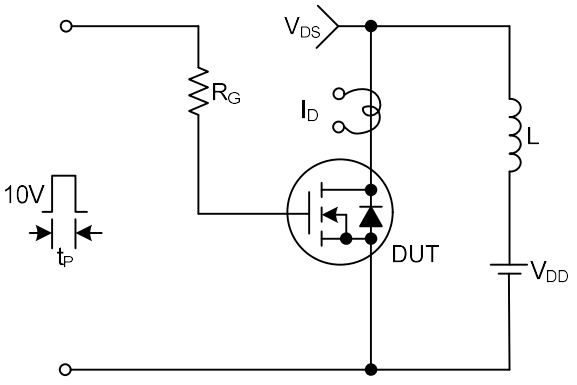
Resistive Switching Test Circuit



Resistive Switching Waveforms

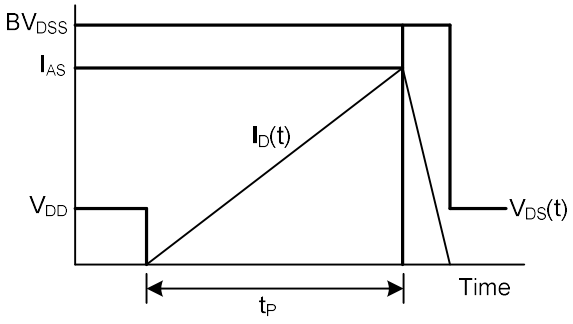


Unclamped Inductive Switching Test Circuit

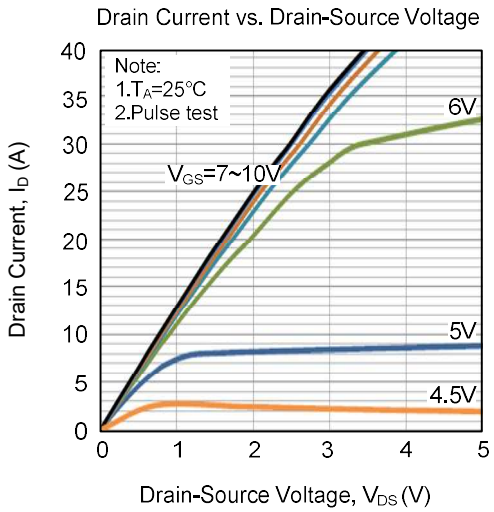


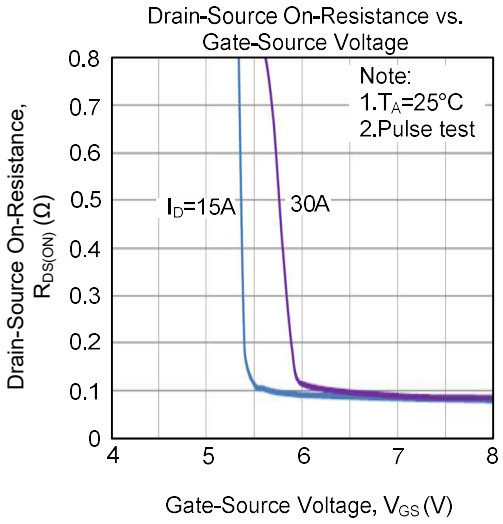
Unclamped Inductive Switching Waveforms

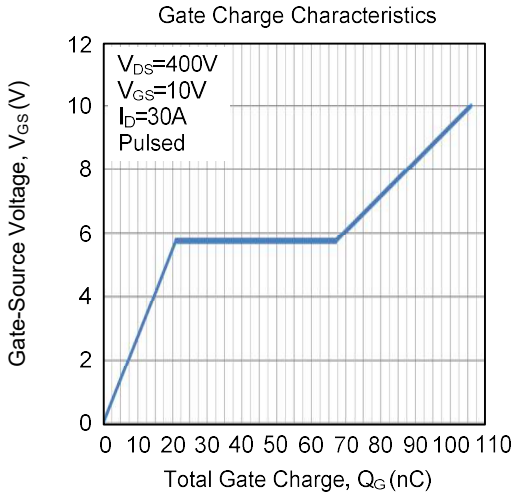
$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

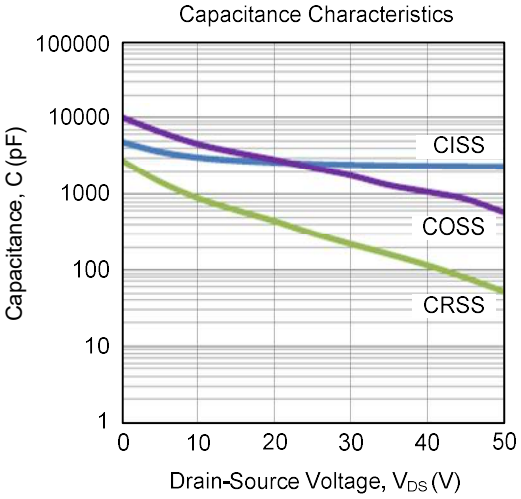


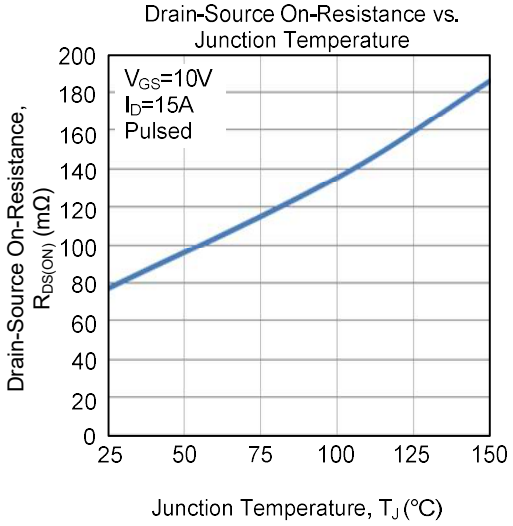
■ TYPICAL CHARACTERISTICS

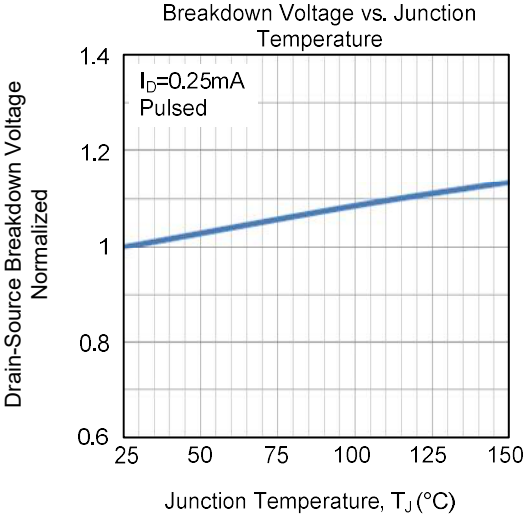




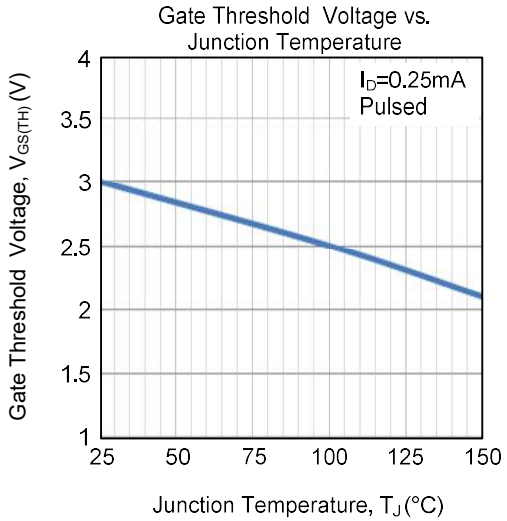


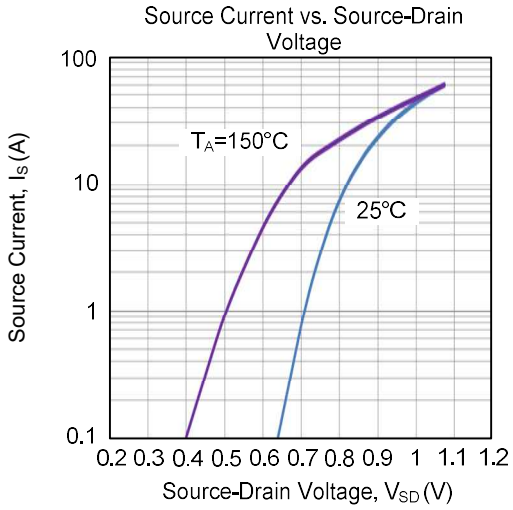


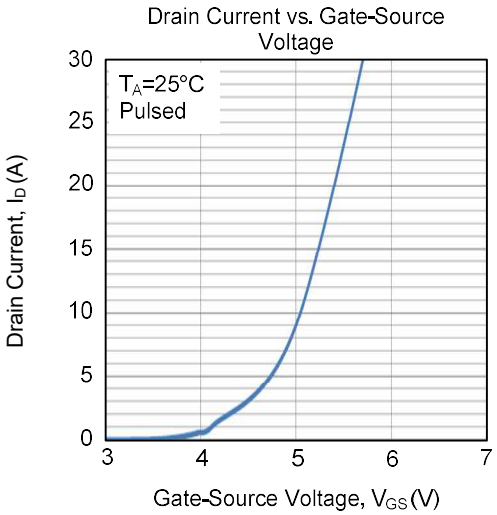


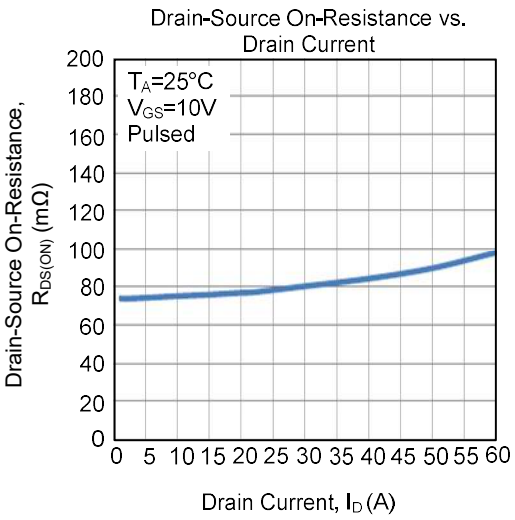


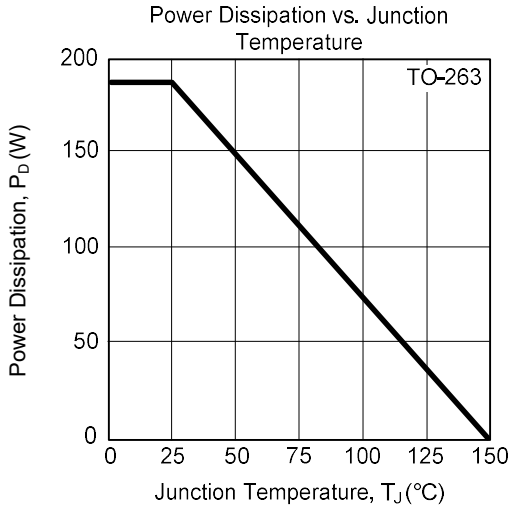
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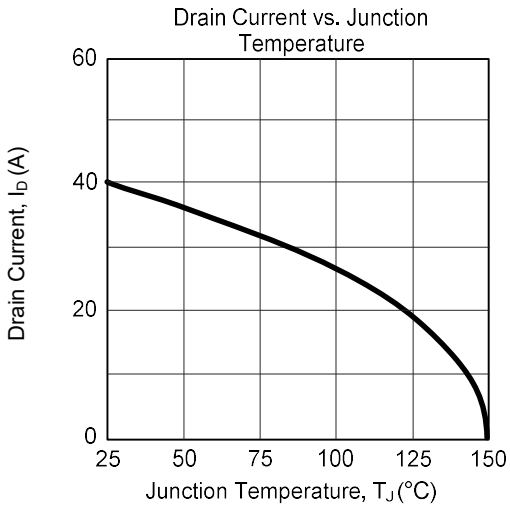




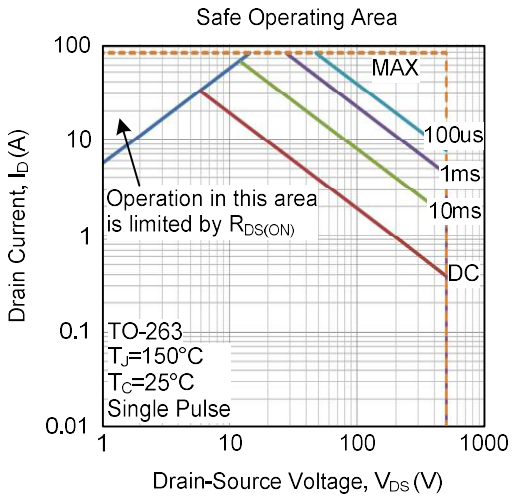








■ TYPICAL CHARACTERISTICS (Cont.)



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