



UT40N04

Power MOSFET

N-CHANNEL LOGIC LEVEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

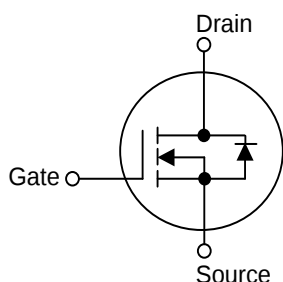
DESCRIPTION

The UTC **UT40N04** is an N-channel enhancement mode FET using advanced technology to provide fast switching speed, ruggedized device design, low on-resistance and cost-effectiveness.

FEATURES

- * Low on-Resistance
- * Fast Switching Speed

SYMBOL

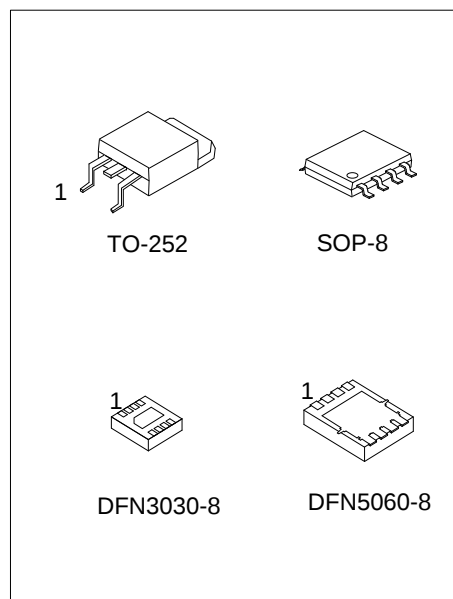


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT40N04L-TN3-R	UT40N04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT40N04L-S08-R	UT40N04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT40N04L-K08-3030-R	UT40N04G-K08-3030-R	DFN3030-8	S	S	S	G	D	D	D	D	Tape Reel
UT40N04L-K08-5060-R	UT40N04G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT40N04G-TN3-R (1)Packing Type (2)Package Type (3)Green Package		(1) R: Tape Reel (2) TN3: TO-252, S08: SOP-8, K08-3030: DFN3030-8 K08-5060: DFN5060-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-252	SOP-8
UTC UT40N04 Lot Code 1 L: Lead Free G: Halogen Free Date Code	8765 UTC UT40N04 Date Code L: Lead Free G: Halogen Free Lot Code 1234
DFN3030-8	DFN5060-8
UT 40N04 Date Code	UTC UT 40N04 Lot Code Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DS}	40	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current		I _D	40	A
Pulsed Drain Current (Note 1)		I _{DM}	80	A
Avalanche Energy		E _{AS}	31.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.8	V/ns
Power Dissipation	TO-252	P _D	40	W
	SOP-8		6.25	W
	DFN3030-8		30	W
	DFN5060-8		35	W
Operating Junction Temperature		T _J	-55 ~ +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}=25A, V_{DD}=20V, R_G=25 Ω, Starting T_J = 25°C

4. I_{SD}≤30A, di/dt≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA (Note 2)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ _{JA}	40	°C/W
	SOP-8		62.5	°C/W
	DFN3030-8		80	°C/W
	DFN5060-8		70	°C/W
Junction to Case	TO-252	θ _{JC}	3.125	°C/W
	SOP-8		20	°C/W
	DFN3030-8		4.16	°C/W
	DFN5060-8		3.57	°C/W

Notes: 1. Independent of Operating Temperature.

2. 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}	I _D =250μA, V _{GS} =0V	40			V	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			10	μA	
Gate- Source Leakage Current	I _{GSS}	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	
Static Drain-Source On-State Resistance (Note 1)	R _{DS(ON)}	V _{GS} =10V, I _D =20A			12	mΩ	
		V _{GS} =4.5V, I _D =10A			16	mΩ	
DYNAMIC PARAMETERS							
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1230		pF	
Output Capacitance	C _{OSS}			144		pF	
Reverse Transfer Capacitance	C _{RSS}			122		pF	
SWITCHING PARAMETERS (Note 2)							
Total Gate Charge	Q _G	V _{DS} =20V, V _{GS} =10V, I _D =40A, I _G =1mA (Note1,2)		34.5		nC	
	Q _G	V _{DS} =20V, V _{GS} =4.5V, I _D =40A, I _G =1mA (Note1,2)		17		nC	
Gate to Source Charge	Q _{GS}			6.6		nC	
Gate to Drain Charge	Q _{GD}			7		nC	
Turn-ON Delay Time	t _{D(ON)}		V _{DS} =20V, V _{GS} =10V, I _D =40A, R _G =25Ω (Note1,2)		8.8		ns
Rise Time	t _R				21		ns
Turn-OFF Delay Time	t _{D(OFF)}			120		ns	
Fall-Time	t _F			48		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current	I _S				40	A	
Maximum Pulsed Drain-Source Diode Forward Current(Note 1)	I _{SM}				80	A	
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _F =40A, V _{GS} =0V			1.3	V	

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

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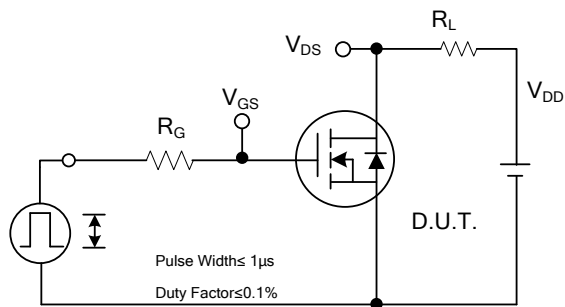
The diagram shows three waveforms over time:

- V_{GS} (Driver):** A square wave pulse. The pulse width is labeled **P.W.** and the total duration is labeled **Period**. The duty cycle is given by $D = \frac{P.W.}{Period}$. The peak voltage is $V_{GS} = 10V$.
- I_{SD} (D.U.T.):** The source-drain current. During the V_{GS} pulse, it shows a negative peak labeled I_{RM} (Body Diode Reverse Current) and a positive peak labeled I_{FM} (Body Diode Forward Current). The reverse current slope is labeled di/dt .
- V_{DS} (D.U.T.):** The drain-source voltage. It shows a trapezoidal pulse. The rising edge is labeled **Body Diode Recovery dv/dt** . The peak voltage is V_{DD} .

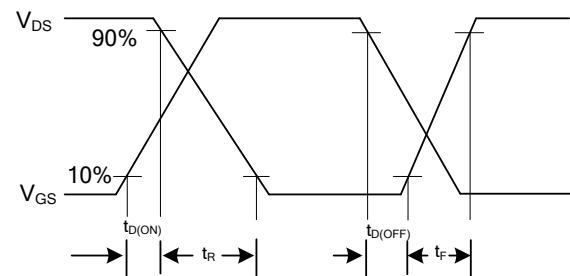
At the bottom, the **Body Diode Forward Voltage Drop** is indicated during the I_{FM} period.

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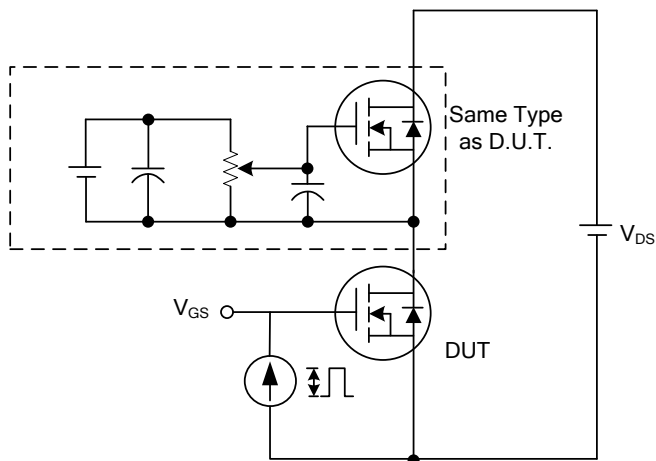
■ TEST CIRCUITS AND WAVEFORMS



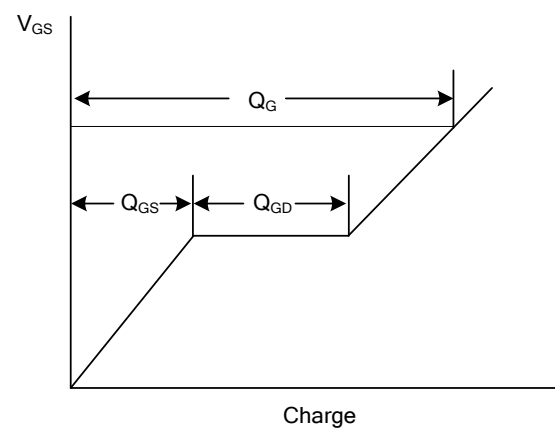
Switching Test Circuit



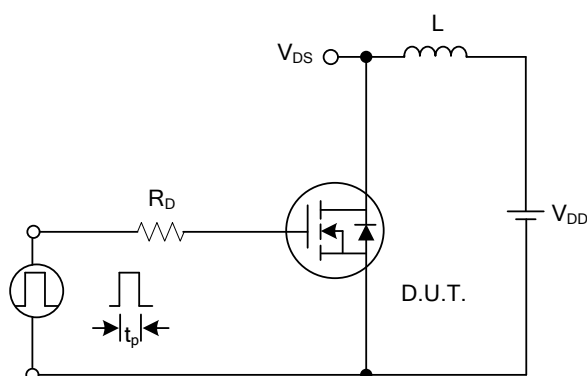
Switching Waveforms



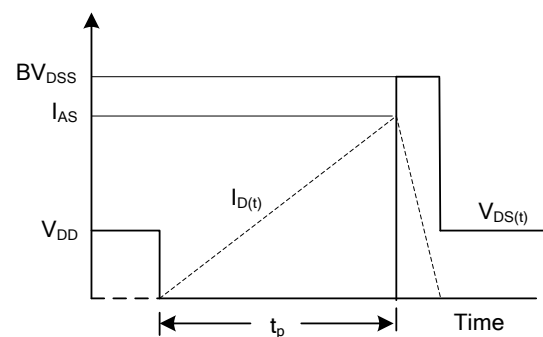
Gate Charge Test Circuit



Gate Charge Waveform

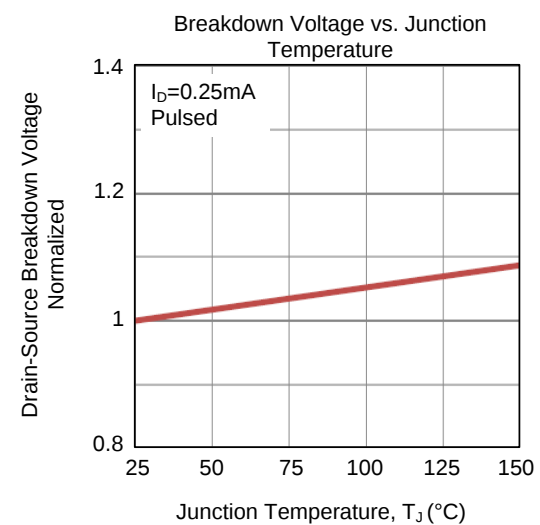
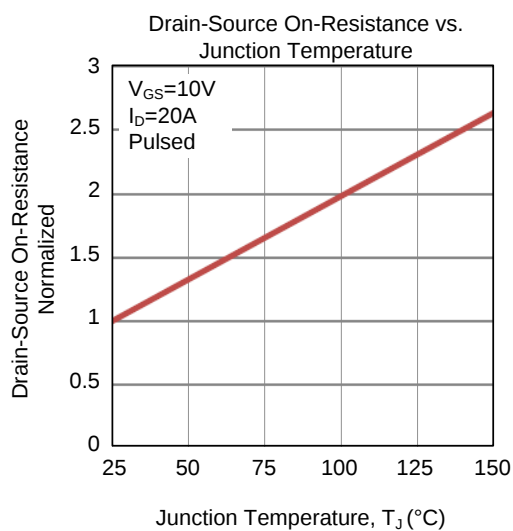
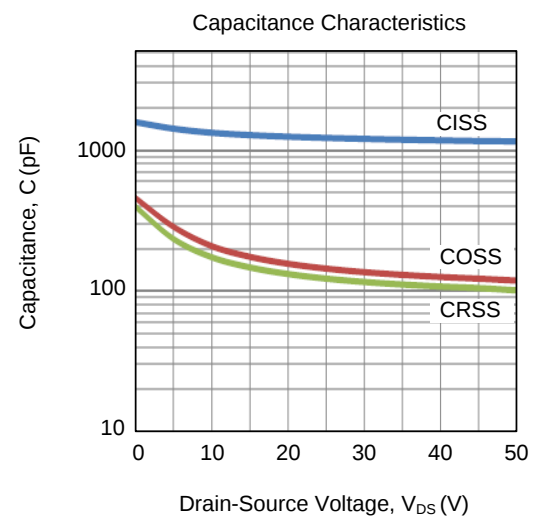
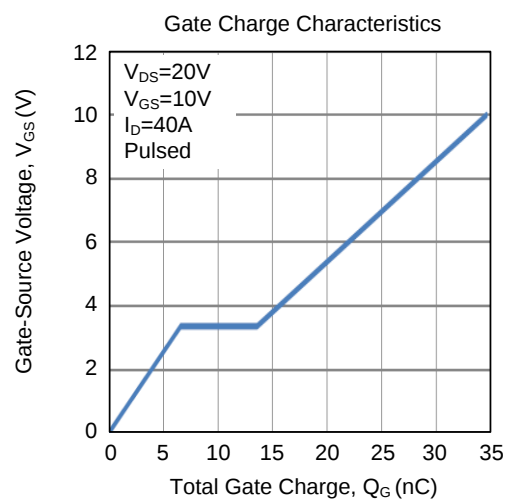
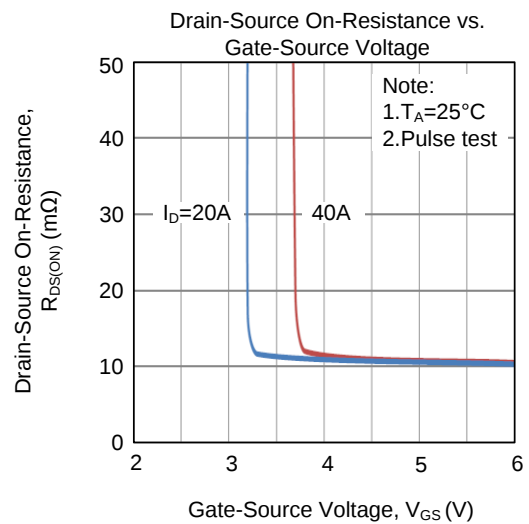
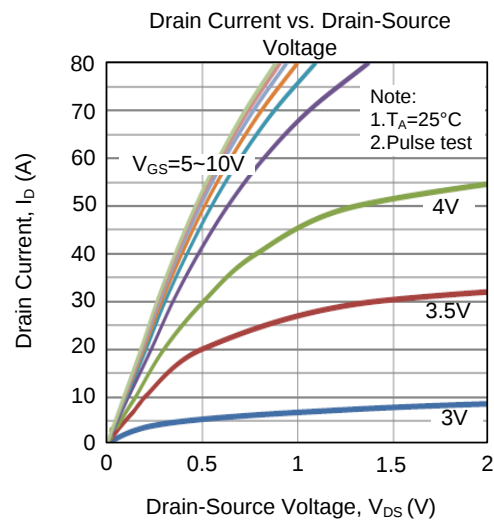


Unclamped Inductive Switching Test Circuit

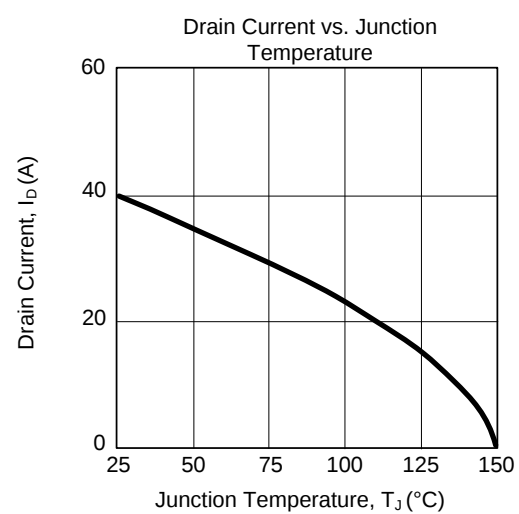
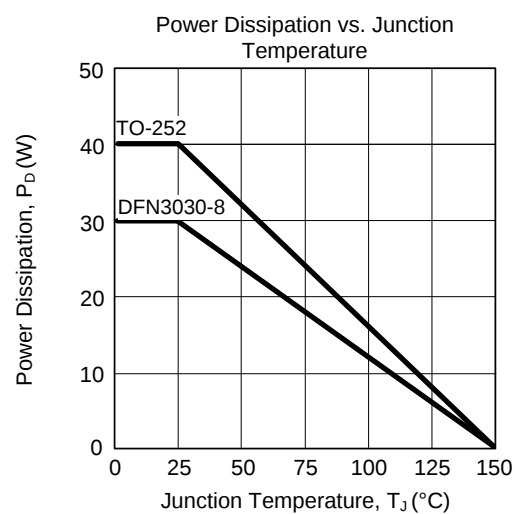
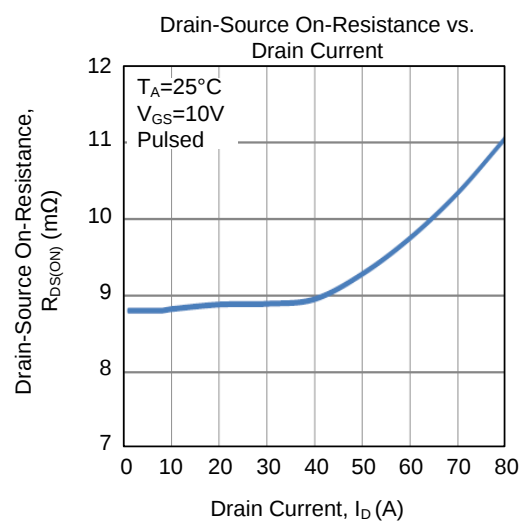
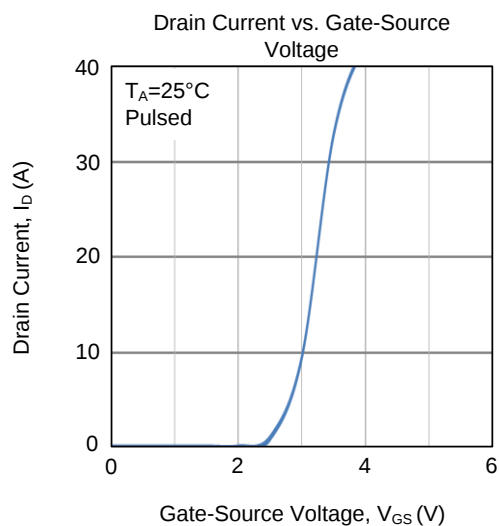
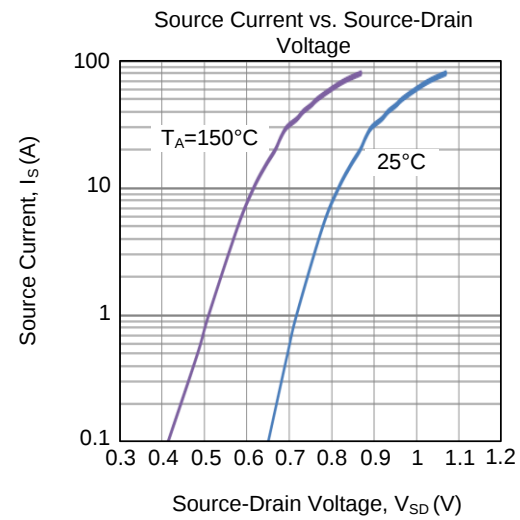
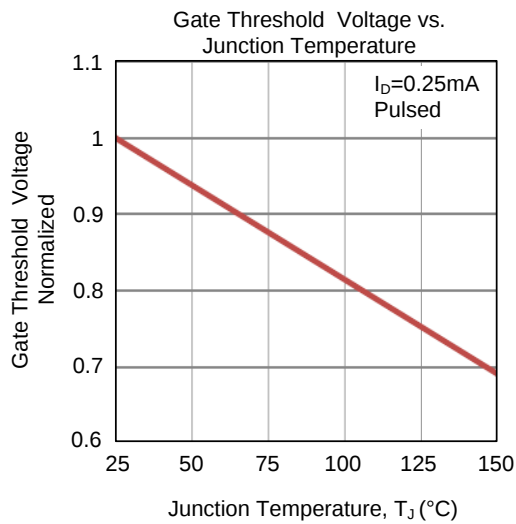


Unclamped Inductive Switching Waveforms

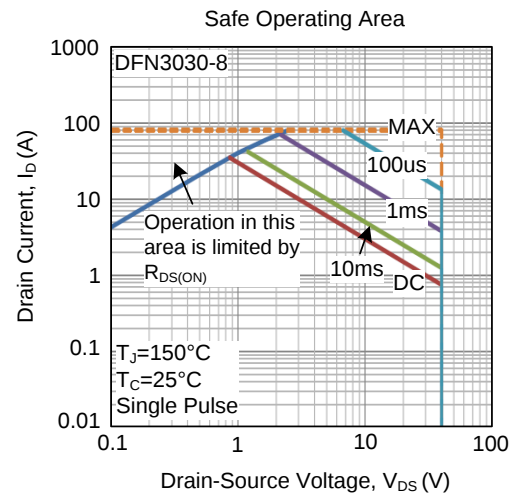
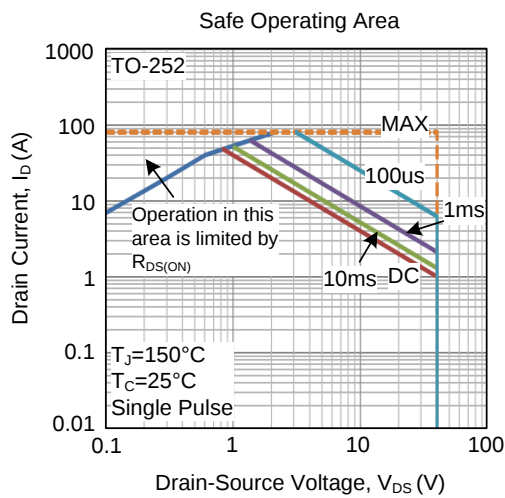
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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