



12P10

Power MOSFET

-9.4A, -100V P-CHANNEL POWER MOSFET

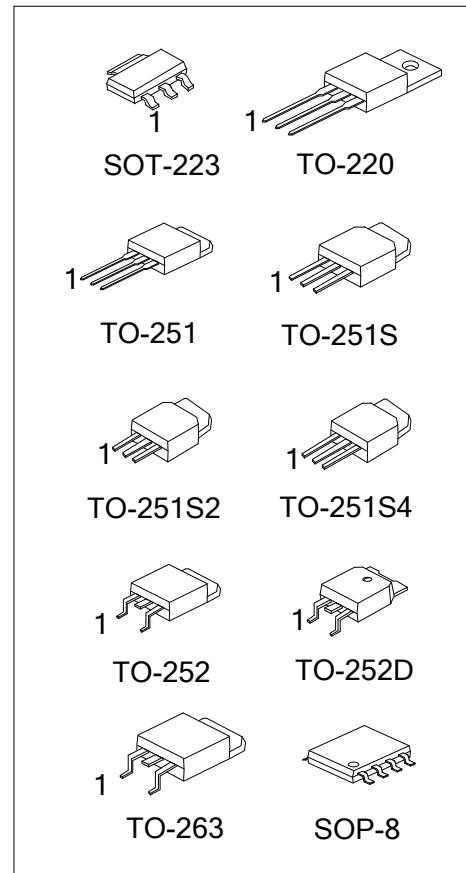
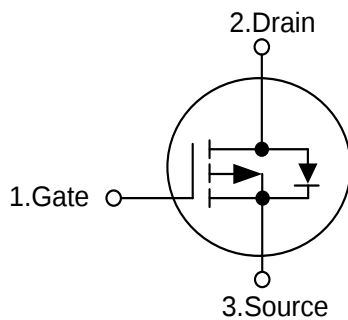
■ DESCRIPTION

The **12P10** uses advanced proprietary, planar stripe, DMOS technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable to be used in low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

■ FEATURES

- * $R_{DS(ON)} \leq 0.29 \Omega$ @ $V_{GS} = -10V$, $I_D = -4.7A$
- * Low capacitance
- * Low gate charge
- * Fast switching capability
- * Avalanche energy specified

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
12P10L-AA3-R	12P10G-AA3-R	SOT-223	G	D	S	-	-	-	-	-	Tape Reel
12P10L-TA3-T	12P10G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
12P10L-TM3-T	12P10G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
12P10L-TMS-T	12P10G-TMS-T	TO-251S	G	D	S	-	-	-	-	-	Tube
12P10L-TMS2-T	12P10G-TMS2-T	TO-251S2	G	D	S	-	-	-	-	-	Tube
12P10L-TMS4-T	12P10G-TMS4-T	TO-251S4	G	D	S	-	-	-	-	-	Tube
12P10L-TN3-R	12P10G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
12P10L-TND-R	12P10G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
12P10L-TQ2-R	12P10G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
12P10L-TQ2-T	12P10G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
12P10L-S08-R	12P10G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

12P10G-AA3-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel, T: Tube (2) AA3: SOT-223, TA3: TO-220, TM3: TO-251, TMS: TO-251S, TMS2: TO-251S2, TMS4: TO-251S4, TN3: TO-252, TND: TO-252D, TQ2: TO-263, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

PACKAGE		MARKING	
SOT-223		12P10 L: Lead Free G: Halogen Free Date Code 1	
TO-220 TO-251 TO-251S TO-251S2	TO-251S4 TO-252 TO-252D TO-263	UTC 12P10 Lot Code L: Lead Free G: Halogen Free Date Code 1	
SOP-8		UTC 12P10 Date Code L: Lead Free G: Halogen Free Lot Code	

■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	-100	V
Gate-Source Voltage		V _{GSS}	±30	V
Continuous Drain Current		I _D	-9.4	A
Pulsed Drain Current (Note 2)		I _{DM}	-37.6	A
Avalanche Current (Note 2)		I _{AR}	-9.4	A
Single Pulsed Avalanche Energy (Note 3)		E _{AS}	280	mJ
Repetitive Avalanche Energy (Note 2)		E _{AR}	5.0	mJ
Power Dissipation	TO-220/TO-263	P _D	73	W
	TO-251/TO-251S		50	W
	TO-251S2/TO-251S4			
	TO-252/TO-252D		8	W
	SOT-223			
	SOP-8		5	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. $L=6.3\text{mH}$, $I_{AS}=-9.4\text{A}$, $V_{DD}=-25\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

4. $I_{SD}\leq -11.5\text{A}$, $di/dt\leq 300\mu\text{A/s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT		
Junction to Ambient	TO-220/TO-263	θ_{JA}	62.5	°C/W		
	TO-251/TO-251S		110	°C/W		
	TO-251S2/TO-251S4					
	TO-252/TO-252D		62.5	°C/W		
	TO-263					
	SOT-223				125	°C/W
	SOP-8				150	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	1.9	°C/W		
	TO-251/TO-251S		2.5	°C/W		
	TO-251S2/TO-251S4					
	TO-252/TO-252D		14	°C/W		
	SOT-223					
	SOP-8				25	°C/W

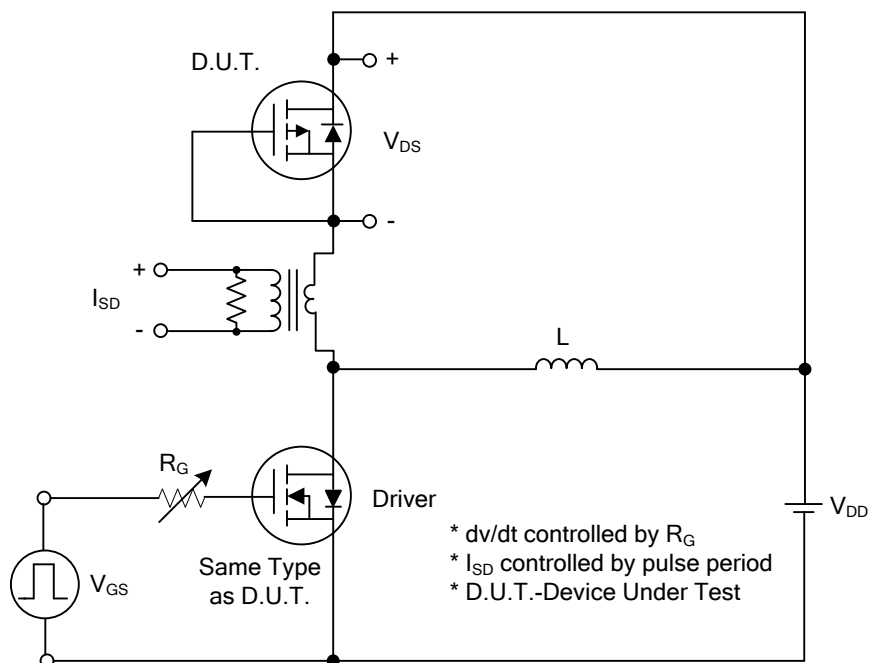
ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0 V, I _D =-250μA	-100			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-100V, V _{GS} =0V			-1	μA
		V _{DS} =-100V, T _C =125°C			-10	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250μA	-2.0		-4.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-4.7A		0.24	0.29	Ω
Forward Transconductance	g _{FS}	V _{DS} =-40V, I _D =-4.7A (Note 1)		6.3		S
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		500		pF
Output Capacitance	C _{OSS}			160		pF
Reverse Transfer Capacitance	C _{RSS}			42		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =-80V, V _{GS} =-10V, I _D =-12A I _G =-1mA (Note 1, 2)		18		nC
Gate Source Charge	Q _{GS}			3		nC
Gate Drain Charge	Q _{GD}			6		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-50V, V _{GS} =-10V, I _D =-12A, R _G =6Ω (Note 1, 2)		4		ns
Turn-ON Rise Time	t _R			18		ns
Turn-OFF Delay Time	t _{D(OFF)}			17		ns
Turn-OFF Fall-Time	t _F			16		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				-9.4	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				-37.6	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-9.4A			-4.0	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =12A, V _{GS} =0V, dI _F /dt=100A/μs		95		nS
Body Diode Reverse Recovery Charge	Q _{rr}			0.7		μC

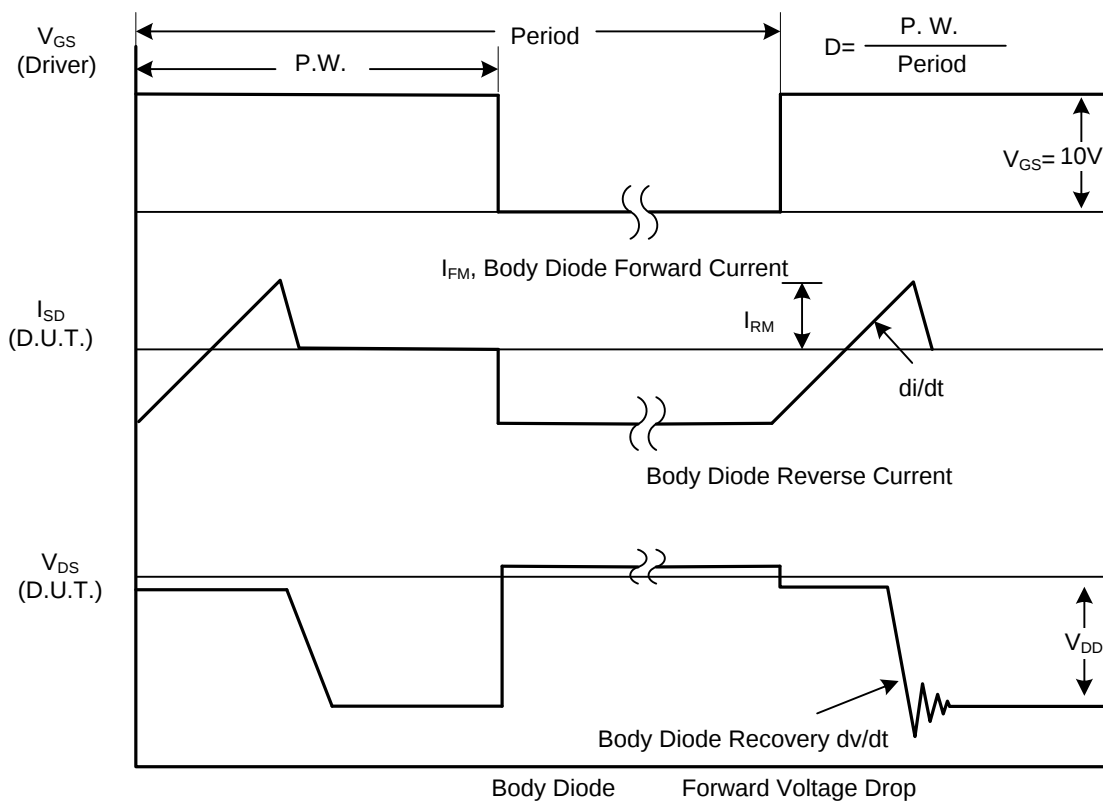
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

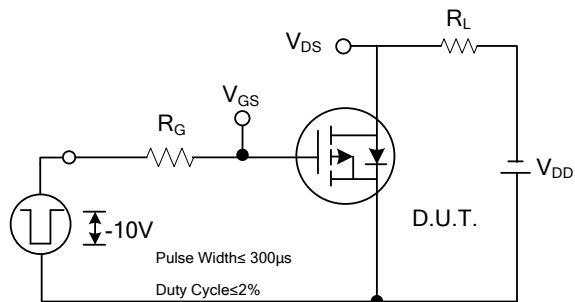


Peak Diode Recovery dv/dt Test Circuit

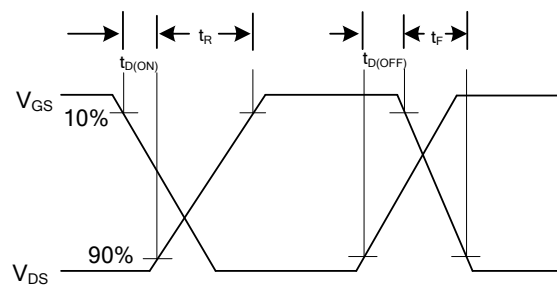


Peak Diode Recovery dv/dt Waveforms

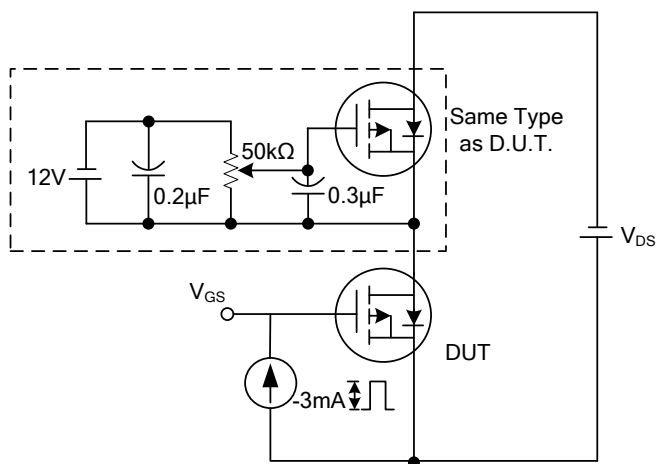
■ TEST CIRCUITS AND WAVEFORMS



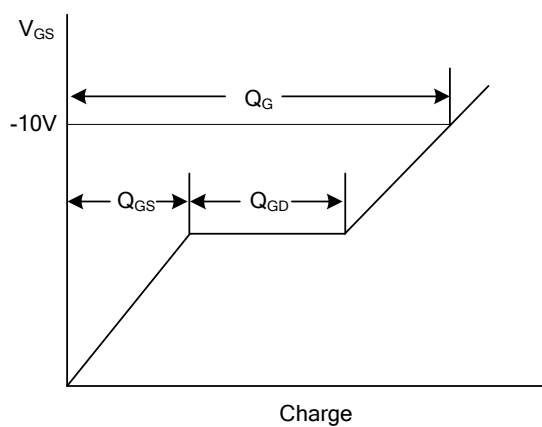
Switching Test Circuit



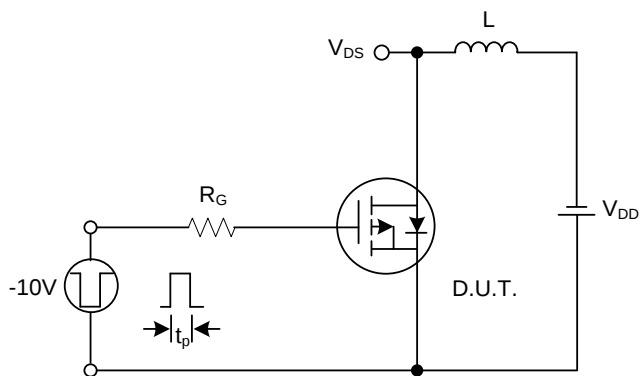
Switching Waveforms



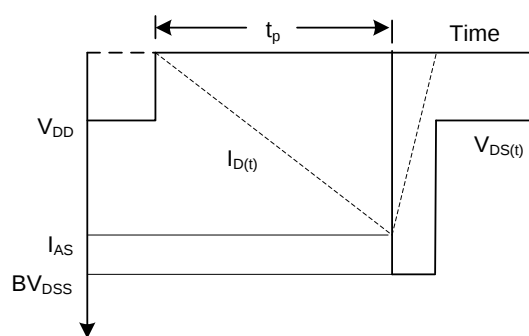
Gate Charge Test Circuit



Gate Charge Waveform



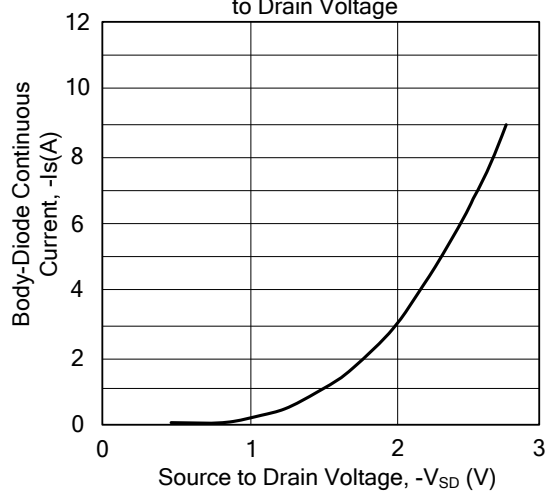
Unclamped Inductive Switching Test Circuit



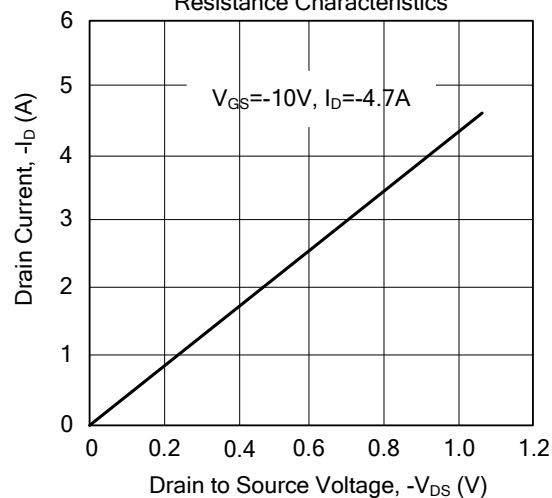
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

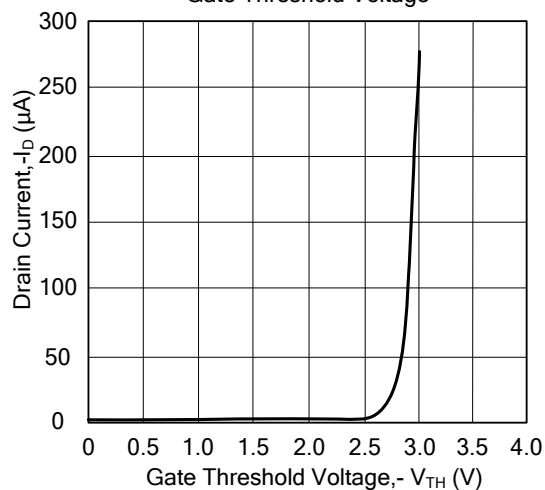
Body-Diode Continuous Current vs. Source to Drain Voltage



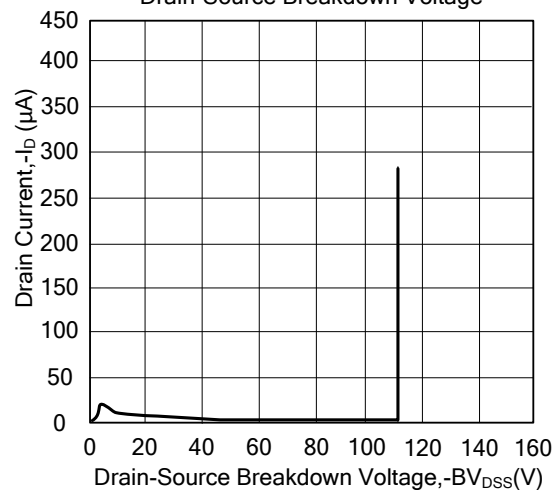
Drain-Source On-State Resistance Characteristics



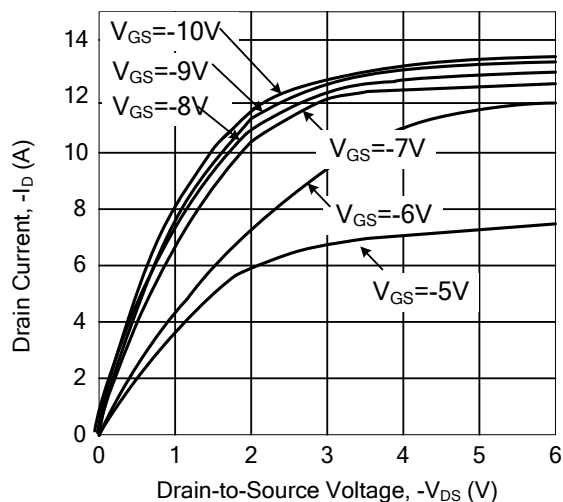
Drain Current vs. Gate Threshold Voltage



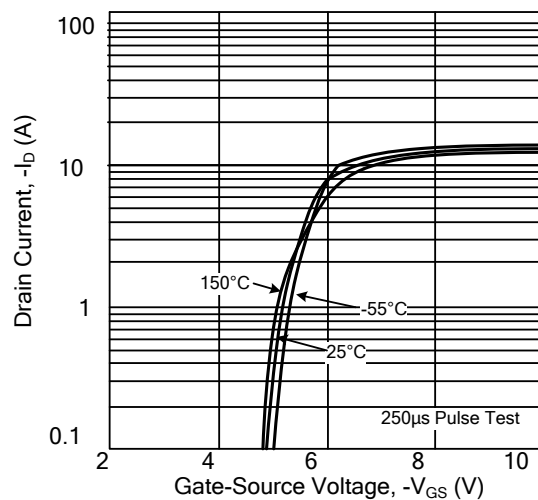
Drain Current vs. Drain-Source Breakdown Voltage



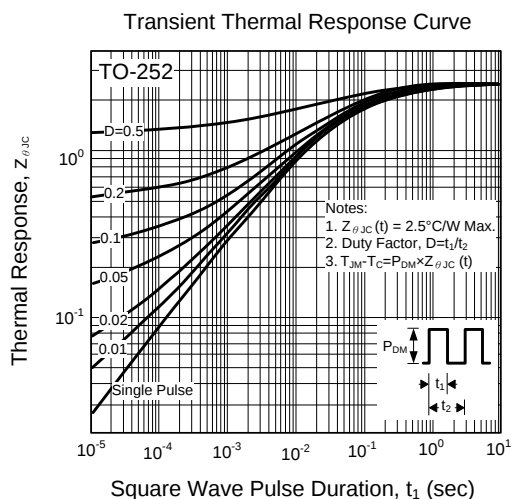
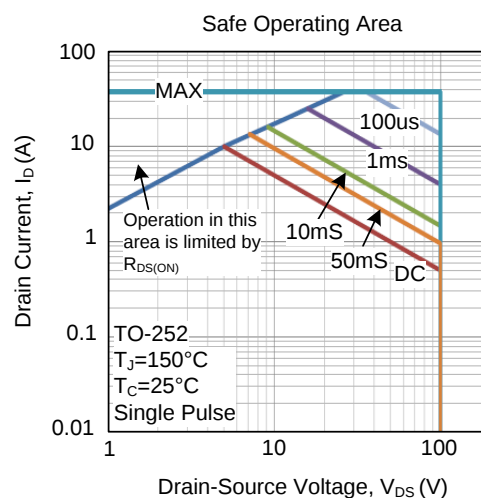
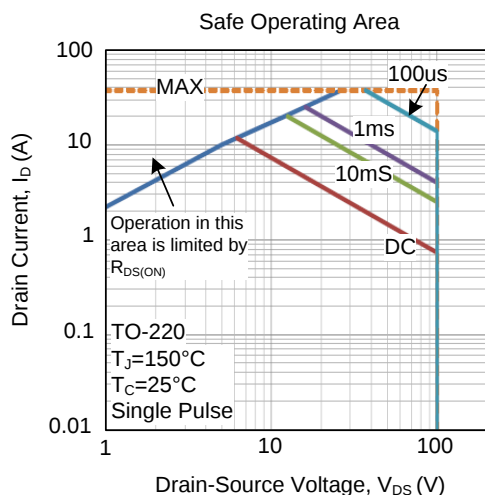
On-State Characteristics



Transfer Characteristics



■ TYPICAL CHARACTERISTICS (Cont.)



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