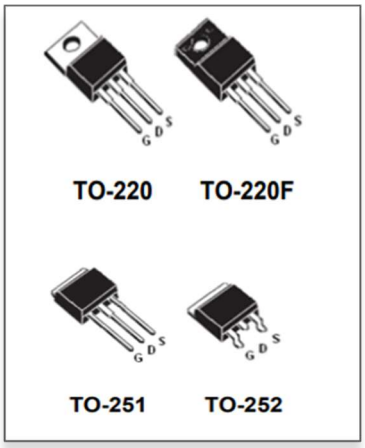
7A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

The **7N65** is a high voltage power MOSFET and is designed to have better characteristics,such as fast switching time, lowgatecharge, lowon-state resistance and have a high rugged avalanche characteristics. This power MOSFET is generally applied in high efficiency switch mode power supplies.

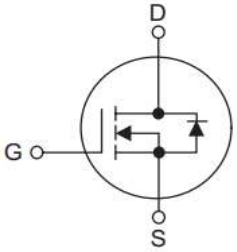


FEATURES

*$R_{DS(ON)}$ < 1.4Ω @V_{GS} = 10 V
*Fast Switching
*Avalanche energy tested
*Improved dv/dt capability, high ruggedness

SYMBOL

1. Gate
2. Drain
3. Source



Package Description

Product Model	Package Type	Mark Name	Indentification Code	Package
CMN7N65P	TO-220	CMN7N65	P	Tube
CMN7N65F	TO-220F	CMN7N65	F	Tube
CMN7N65U	TO-251	CMN7N65	U	Tube
CMN7N65D	TO-252	CMN7N65	D	Tape Reel

CMN7N65P

(2) Package type

(1) Chip name

(1) CMN7N65: 650V 7A (2) F:TO-220F P:TO-220 D:TO-252 U:TO-251

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	650	V
Gate-Source Voltage			V_{GSS}	±30	V
Drain Current	Continuous (Tc=25°C)		I_D	7	A
	Continuous (Tc=100°C)			4.5	A
	Pulsed (Note 2)		I_{DM}	14	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	700	mJ
	Repetitive (Note 2)		E_{AR}	14	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	3.3	V/ns
Power Dissipation	TC=25°C	TO-220	PD	125	W
		TO-220F		35	W
		TO-251/TO-251		55	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=100mH, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤ 7.0A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J = 25°C

THERMAL CHARACTERISTICS

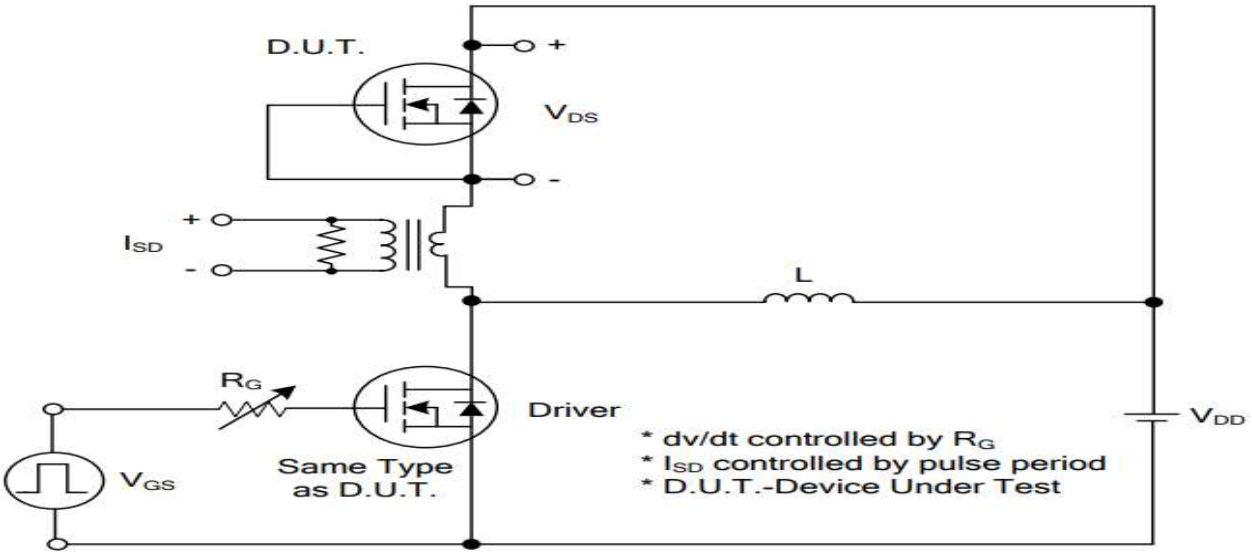
Symbol	Parameter	PACKAGE	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	TO-220	1.0	°C/W
		TO-220F	3.57	°C/W
		TO-251/TO-252	2.27	°C/W
$R_{\theta JA}$	Junction-to-Ambient	TO-220/TO-220F	62.5	°C/W
		TO-251/TO-252	110	°C/W

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

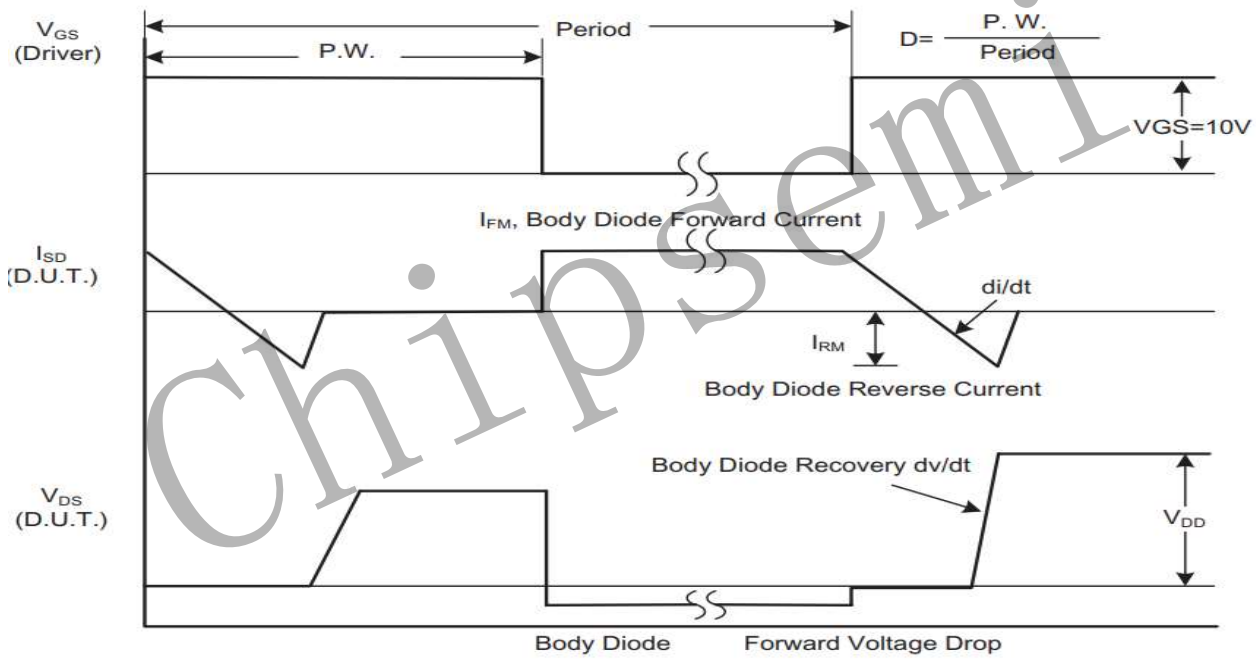
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0V, I_D = 250μA	650		900	V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 650V, V_{GS} = 0V			120	nA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS} = 30V, V_{DS} = 0V			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	2.3		3.8	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS} = 10V, I_D = 3.5A	0.825		1.3	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0 MHz	1089	1095	1102	pF
Output Capacitance		C_{OSS}			102		pF
Reverse Transfer Capacitance		C_{RSS}			10		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=520V,V_{GS}=10V, I_D=7.0A I_G=100μA (Note 1, 2)		23		ns
Gateource Charge		Q_{GS}			8.4		ns
Gate-Drain Charge		Q_{GD}			4.6		ns
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=7.0A,R_G=25Ω (Note 1, 2)		12		ns
Rise Time		t_R			17.5		nC
Turn-off Delay Time		$t_{D(OFF)}$			60		nC
Fall-Time		t_F			27		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				7	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				14	A
Drain-Source Diode Forward Voltage (Note 1)		VSD	V_{GS}=0V, I_S=7A	0.7		1.4	V
Reverse Recovery Time ((Note 1))		t_{rr}	V_{GS} = 0V, I_S = 7A, dI_F / dt = 100A/μs (Note 1)		424		ns
Reverse Recovery Charge		Q_{RR}			3.2		μC

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

TEST CIRCUITS AND WAVEFORMS

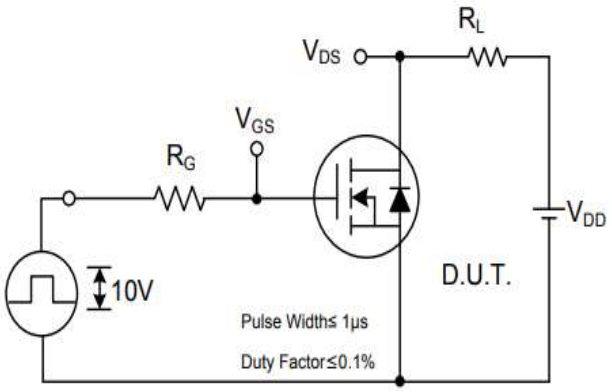


Peak Diode Recovery dv/dt Test Circuit

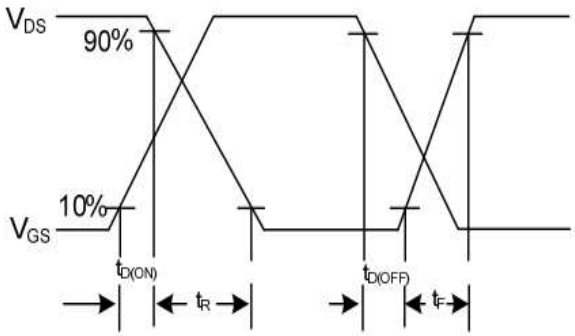


Peak Diode Recovery dv/dt Waveforms

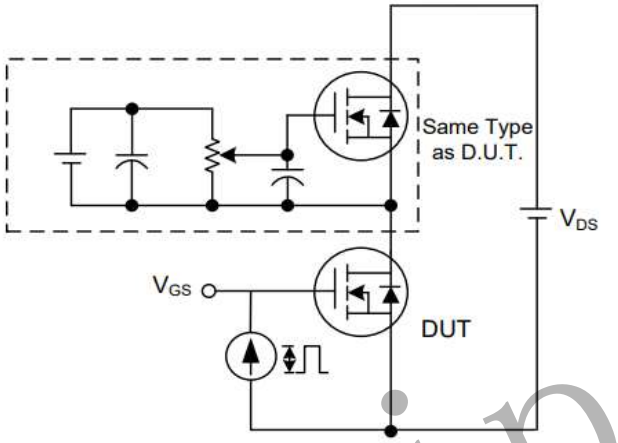
TEST CIRCUITS AND WAVEFORMS(Cont.)



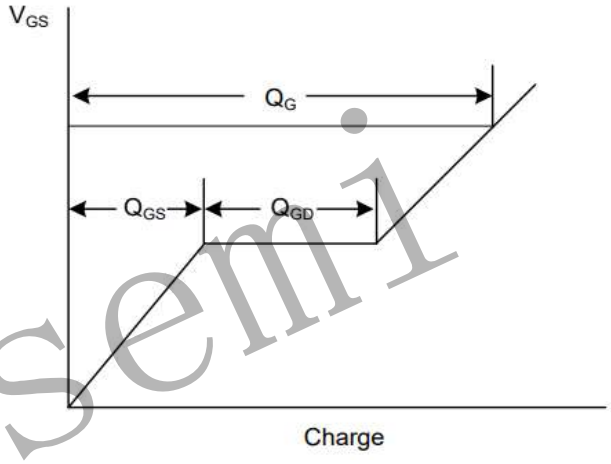
Switching Test Circuit



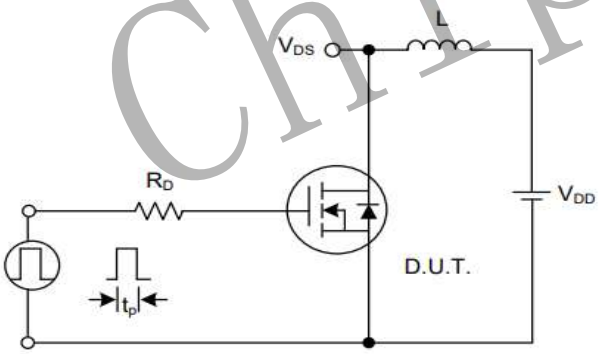
Switching Waveforms



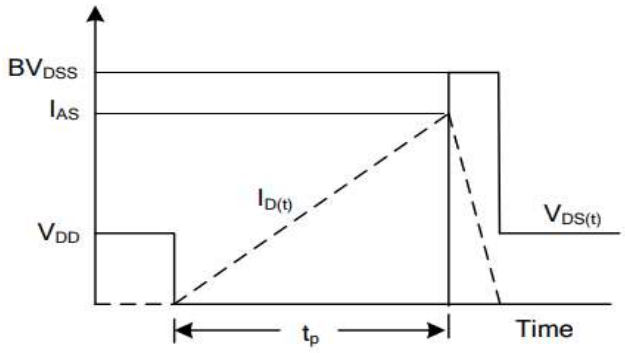
Gate Charge Test Circuit



Gate Charge Waveform



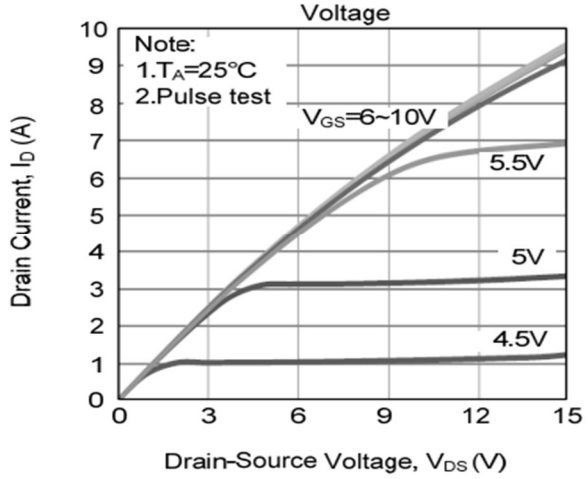
Unclamped Inductive Switching Test Circuit



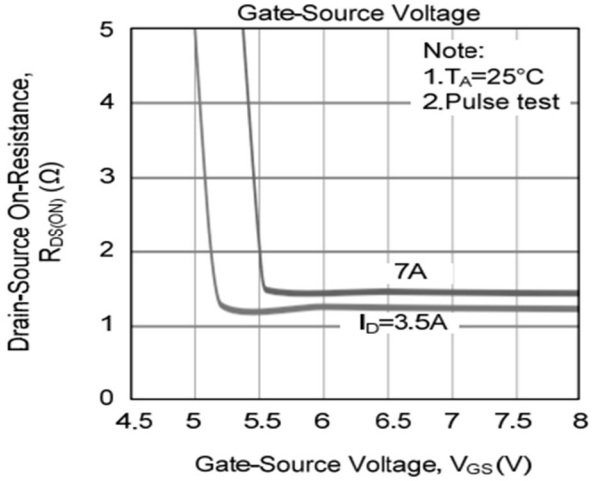
Unclamped Inductive Switching Waveforms

YPICAL CHARACTERISTICS

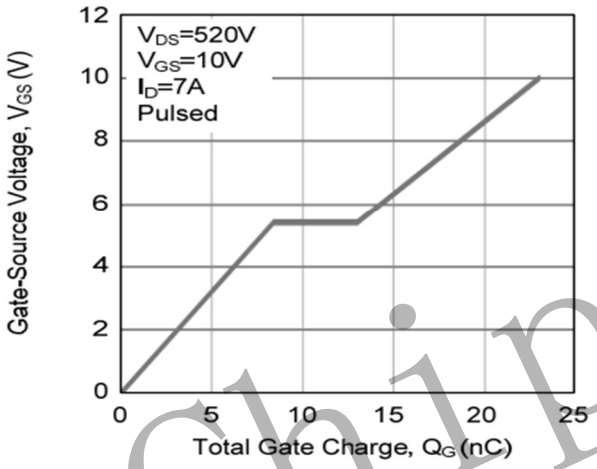
Drain Current vs. Drain-Source Voltage



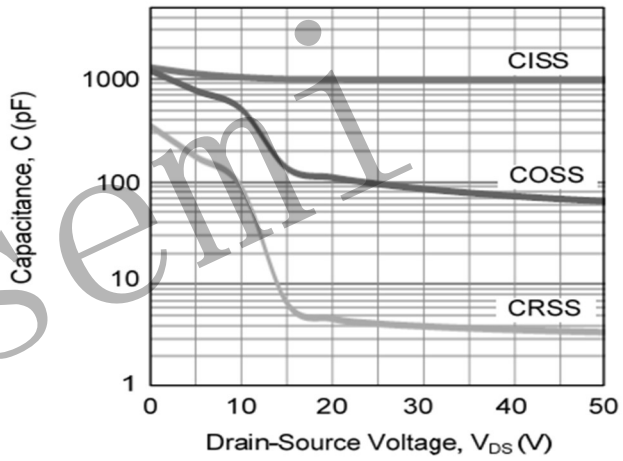
Drain-Source On-Resistance vs. Gate-Source Voltage



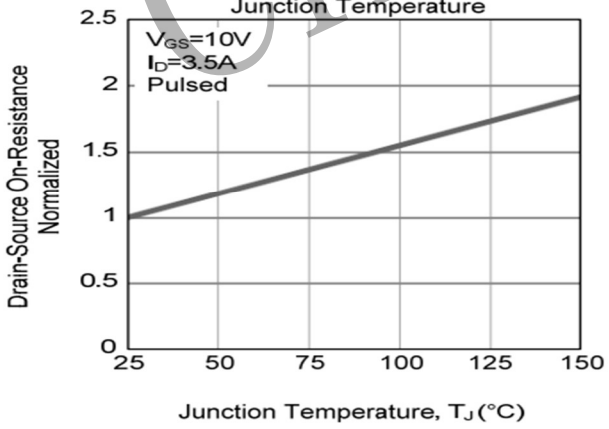
Gate Charge Characteristics



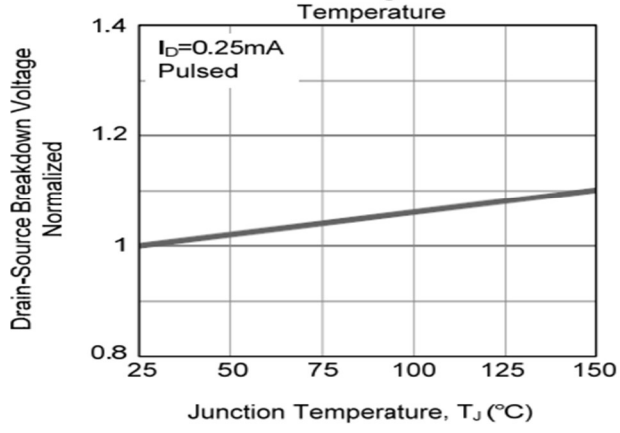
Capacitance Characteristics



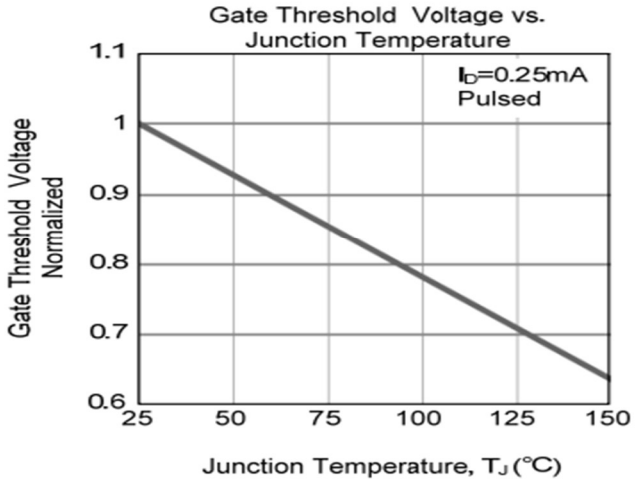
Drain-Source On-Resistance vs. Junction Temperature

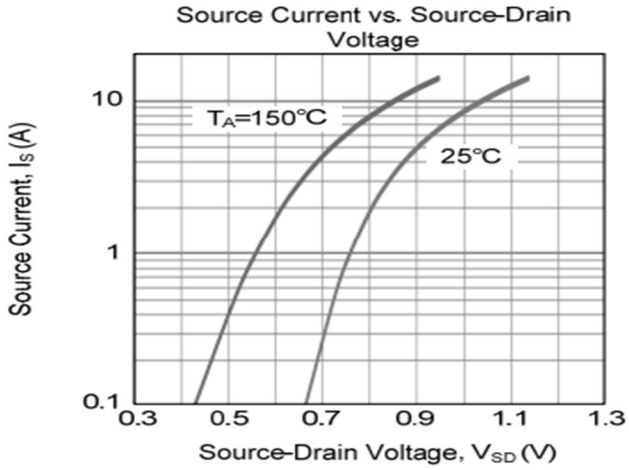


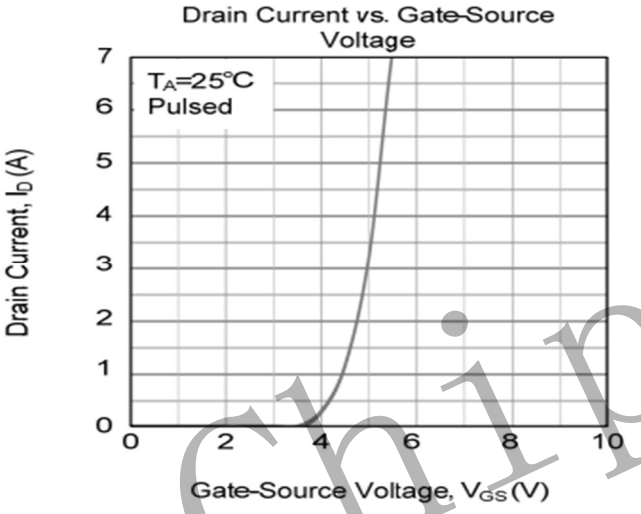
Breakdown Voltage vs. Junction Temperature

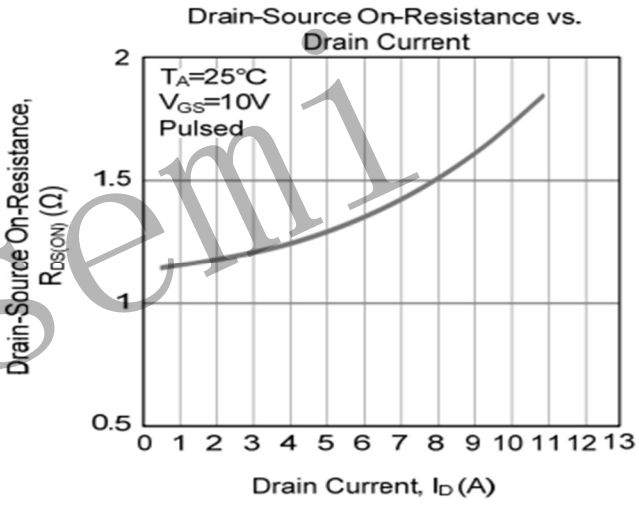


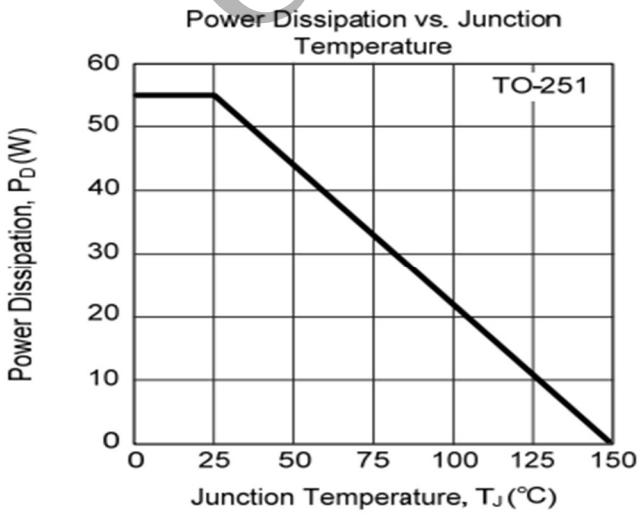
TYPICAL CHARACTERISTICS (Cont.)

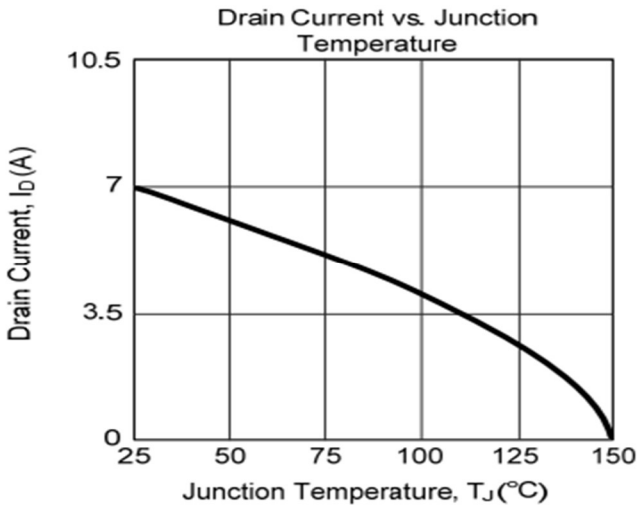












Attentions

- Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
- When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
- MOSFET is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
- Chipsemi reserves the right to make changes in this specification sheet and is subject to change without prior notice.

Appendix

Revision history:

Date	REV.	Description	Page
2023.3	1.0	Original	8