NextGen Components,Inc.

PART CODE: TO220FMDD4N65F

SPECIFICATION SHEET

SPECIFICATION SHEET NO.	Q0721- TO220FMDD4N65F
DATE	July. 21, 2023
REVISION	A0
DESCRIPITION	SMD Plastic-Encapsulate MOSFETS, TO-220F series, 3 Pins MDD4N65F Type, 650V N-Channel Enhancement Mode MOSFET Drain-Source Voltage: 650V, Continuous Drain Current 4.0A Junction Temperature: +150°C, Package in Tube, 50pcs/Tube RoHS/RoHS III compliant
CUSTOMER	
CUSTOMER PART NUMBER	
CROSS REF. PART NUMBER	
ORIGINAL PART NUMBER	MDD4N65F
PART CODE	TO220FMDD4N65F

VENDOR APPROVE			
Issued/Checked/Approved			
DATE: July. 21, 2023			

CUSTOMER APPROVE
DATE:

NextGen Components,Inc.

PART CODE: TO220FMDD4N65F

SMD PLASTIC-ENCAPSULATE MOSFETS TO-220F SERIES

MAIN FEATURE

- Ultra Low Gate Charge
- Low Reverse Transfer Capacitance
- Fast Switching Capability
- Avalanche Energy Tested
- Improved dv/dt Capability and High Ruggedness

APPLICATION

- High Efficiency Switch Mode Power Supplies
- Electronic Lamp Ballasts Based On Half Bridge
- LED Power Supplies

RFQ
Request For Quotation

PART CODE GUIDE

TO220F	MDD	4N65	F
1	2	3	4

1) **TO220:** SMD Plastic-Encapsulate MOSFETS, TO-220F -3L series, 3 pins

2) **MDD**: Original Supplier Code

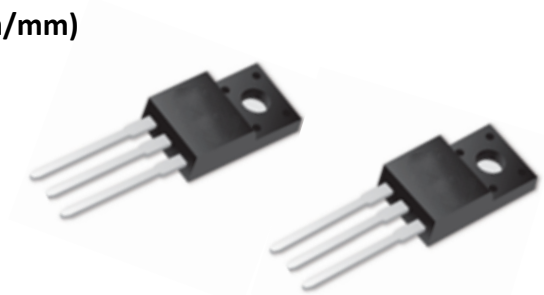
3) **4N65**: Main Specification code for I_D: 4A , N: N-Channel and V_{DS} : 650V

4) **F:** Internal Control Code, (A~Z or 1~9 or Blank) or custom parametric data

SMD PLASTIC-ENCAPSULATE MOSFETS TO-220F SERIES

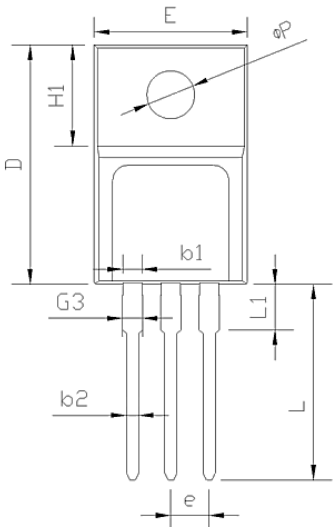
DIMENSION (Unit: Inch/mm)

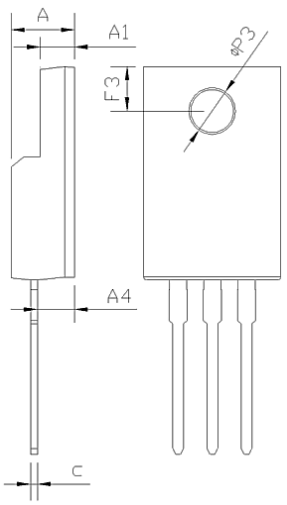
Image for reference



Marking: 4N65F

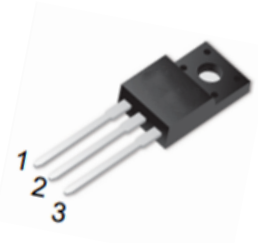
TO-220F-3L

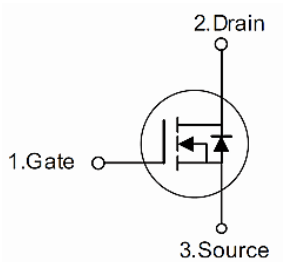




Symbol	Value (mm)		
	Min.	Typ.	Max.
E	9.96	10.16	10.36
A	4.50	4.70	1.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70 REF		
e	2.54 BSC		
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.8	0.95

EQUIVALENT CIRCUIT DIAGRAM





SMD PLASTIC-ENCAPSULATE MOSFETS TO-220F SERIES

650V N-CHANNEL ENHANCEMENT MODE MOSFET

$V_{(BR)DSS}$	$I_{D\ (TC+\ 25°C)}$	$R_{DS\ (on),max}$	$Q_{g,typ}$
650V	4A	2.8 Ω @ V_{GS}=10V	12 nC

ABSOLUTE MAX. RATINGS AT (Ta=25 °C unless otherwise specified)

Parameter	SYMBOLS	VALUE	UNIT
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	4.0	A
Pulsed Drain Current(Note 1)	I_D	16	A
Avalanche Energy Single Pulsed (Note 2)	E_{AS}	198	mJ
Continuous diode forward current	I_S	4	A
Diode pulse current	$I_{S,pulse}$	16	A
Peak Diode Recovery dv/dt (Note 3)	dv/dt	5.0	V/ns
Power Dissipation (TO-220F)	P_D	32	W
Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

THERMAL CHARACTERISTICS

Parameter	SYMBOLS	VALUE (TO-220F)	UNIT
Thermal resistance, Junction-to-case	$R_{\theta JC}$	3.8	°C/W
Thermal resistance, Junction-to-ambient	$R_{\theta JA}$	62.5	°C/W

Notes:

1. Pulse width limited by maximum junction temperature. **2.** L=10mH, I_{AS} = 6.3A, Starting T j= 25°C.

3. I_{SD} = 4A, di/dt≤100A/us, VDD≤BVDS, Starting Tj= 25°C.

SMD PLASTIC-ENCAPSULATE MOSFETS TO-220F SERIES

MOSFET ELECTRICAL CHARACTERISTICS AT Ta=25 °C (unless otherwise specified)

Parameter		SYMBOLS	VALUE			UNIT	Condition
			Min.	Typ.	Max.		
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	650	-	-	V	V_{GS}=0V I $_D$=250μA
Gate-Source Leakage Current	Forward	I_{GSS}	-	-	100	nA	V_{GS}=30V, V_{DS}=0V
	Reverse		-	-	-100	nA	V_{GS}=-30V, V_{DS}=0V
Drain-Source Leakage Current		I_{DSS}	-	-	1	μA	V_{DS}=650V, V_{GS}=0V
Gate Threshold Voltage		$V_{GS(TH)}$	2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250μA
Drain-Source On-State Resistance		$R_{DS(ON)}$	-	2.5	2.8	Ω	V_{GS}=10V, I_{DS}=2A

DYNAMIC ELECTRICAL CHARACTERISTICS

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}	-	600	-	pF	V_{DS}=25V V_{GS}=0V f =1MHz
Output Capacitance	C_{oss}	-	55	-		
Reverse Transfer Capacitance	C_{rss}	-	3.2	-		
Total Gate Charge	Q_g	-	12	-	nC	V_{DS}=520V V_{GS} =10V ID=4A (Note1, 2)
Gate Source Charge	Q_{gs}	-	3.2	-		
Gate Drain Charge	Q_{gd}	-	5.1	-		

SWITCHING CHARACTERISTICS

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Turn on Delay Time	$t_{d(on)}$	-	-	12	ns	V_{DD}=325V I_D=4A R_G = 10Ω
Turn on Rise Time	t_r	-	-	31		
Turn Off Delay Time	$t_{d(off)}$	-	-	42		
Turn Off Fall Time	t_f	-	-	15		

SOURCE DRAIN DIODE CHARACTERISTICS

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Source drain current (Body Diode)	I_{SD}	-	-	4	A	
Pulsed Current	I_{SM}	-	-	16	A	
Drain-Source Diode Forward Voltage	V_{SD}	-	0.8	1.5	V	I_S=4A, V_{GS}=0V
Body Diode Reverse Recovery Time	t_{rr}	-	282	-	ns	V_R=400 I_F=4A, -diF/dt =100A/μs
Body Diode Reverse Recovery Charge	Qrr	-	1.4	-	uC	

Notes:

1.Pulse test ; Pulse width≤300us, duty cycle≤2%. **2.** Essentially independent of operating temperature.

ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 1. Typical Output Characteristics

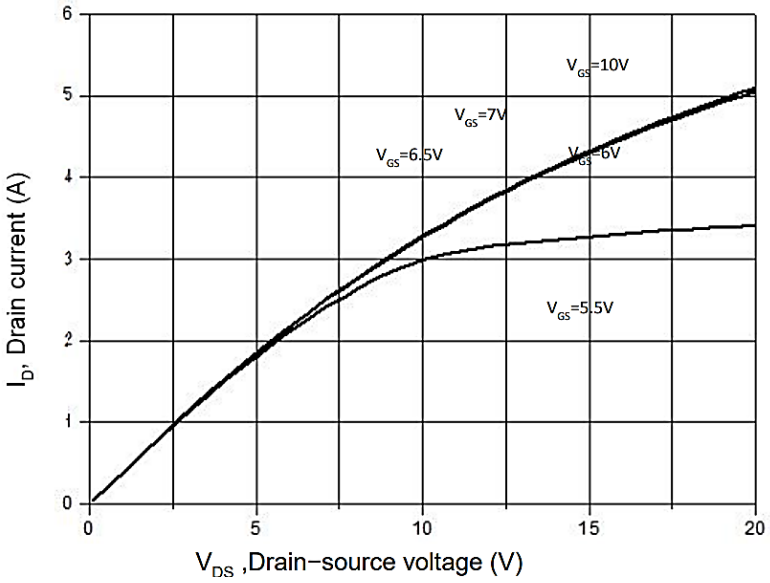
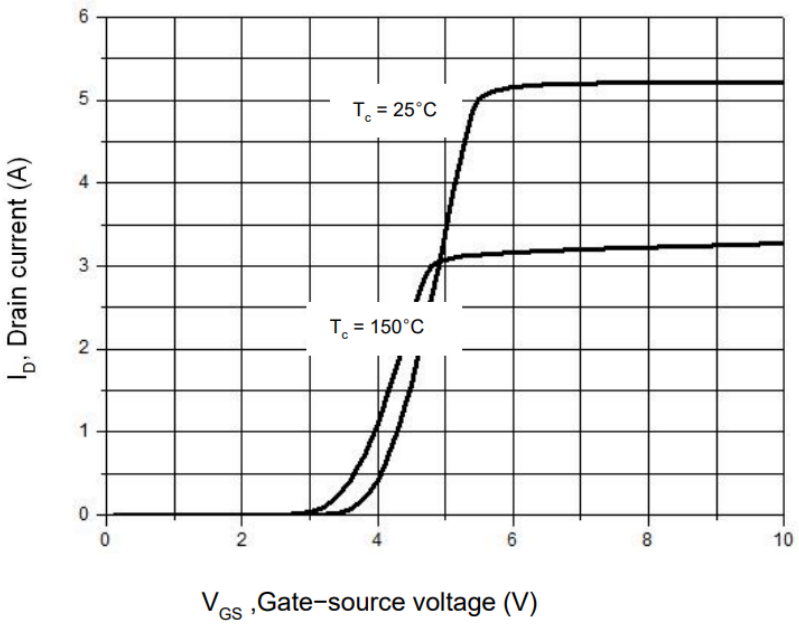


Figure 2. Transfer Characteristics



ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 3. On-Resistance Variation vs. Drain Current

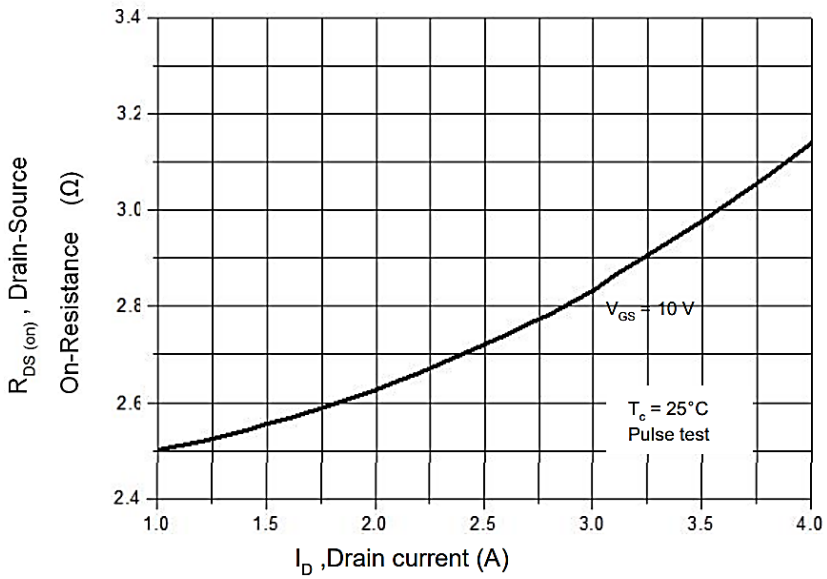
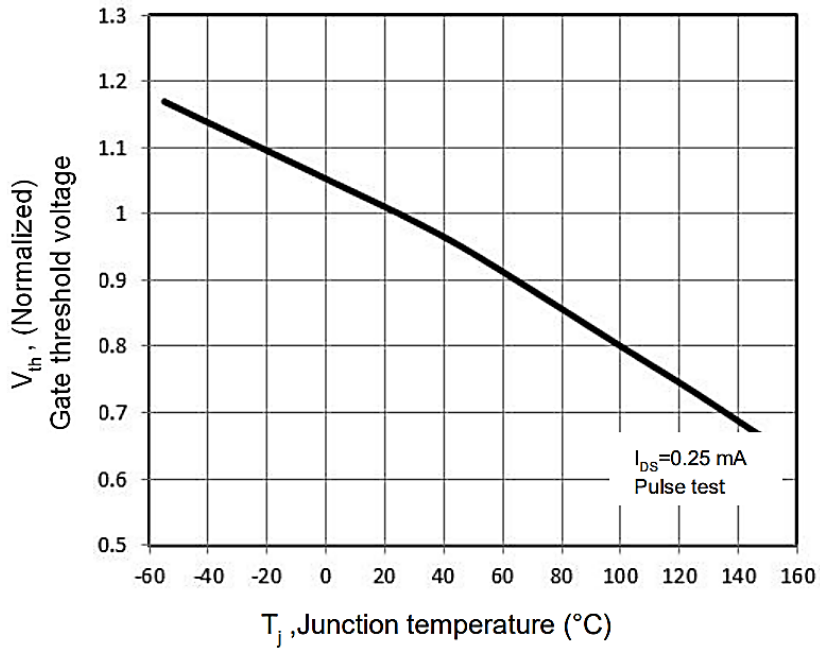


Figure 4. Threshold Voltage vs. Temperature



ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 5. Breakdown Voltage vs. Temperature

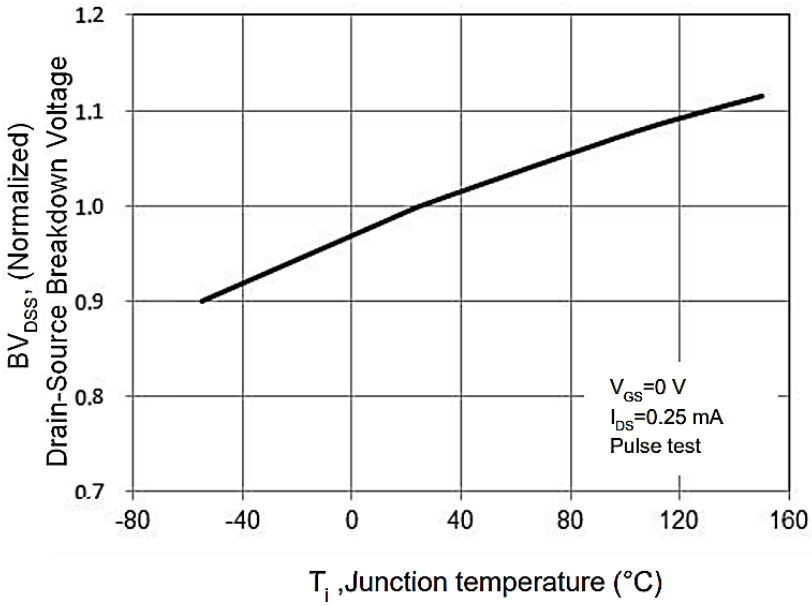
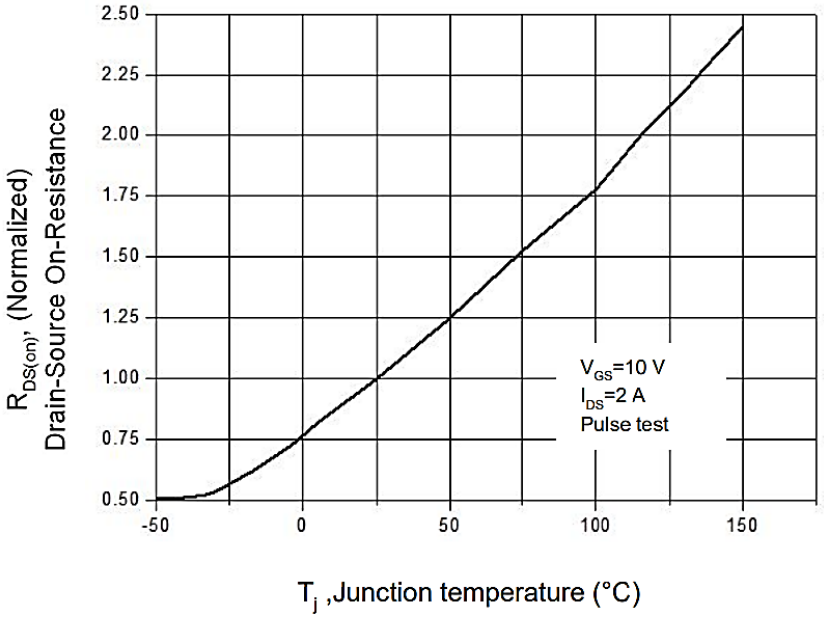


Figure 6. On-Resistance vs. Temperature



ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 7. Capacitance Characteristics

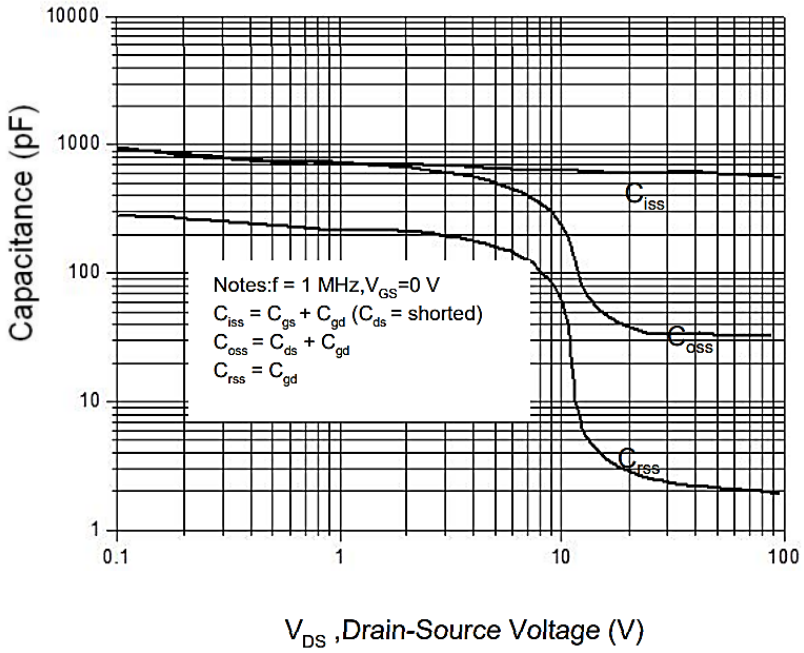
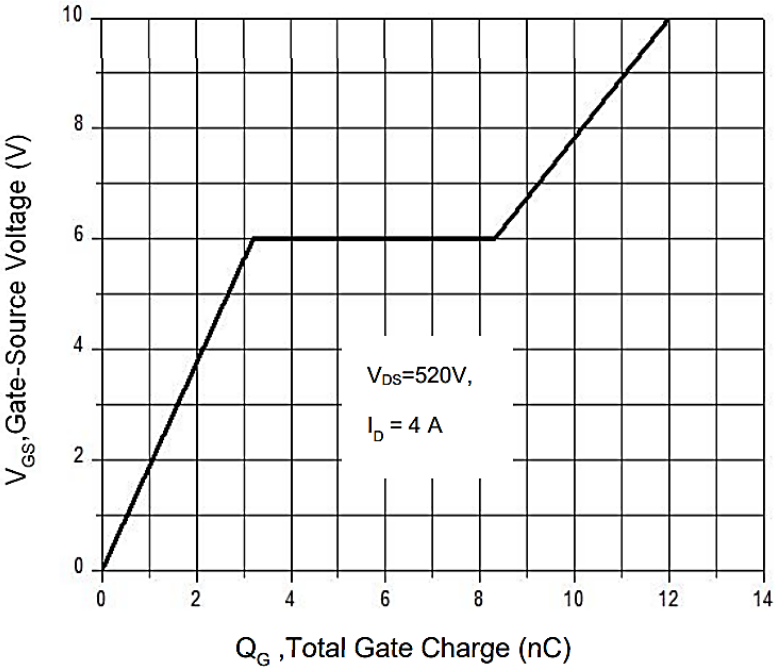


Figure 8. Gate Charge Characterist



ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 9. Maximum Safe Operating

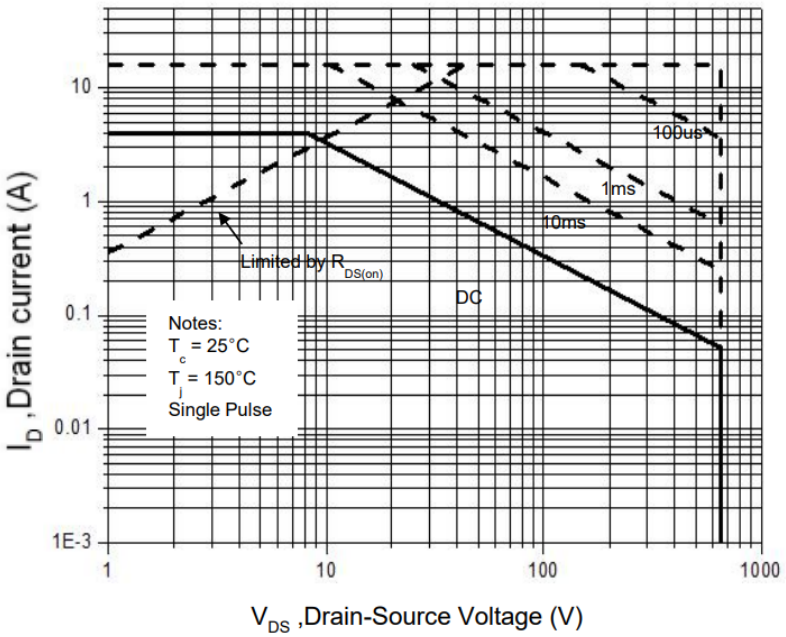
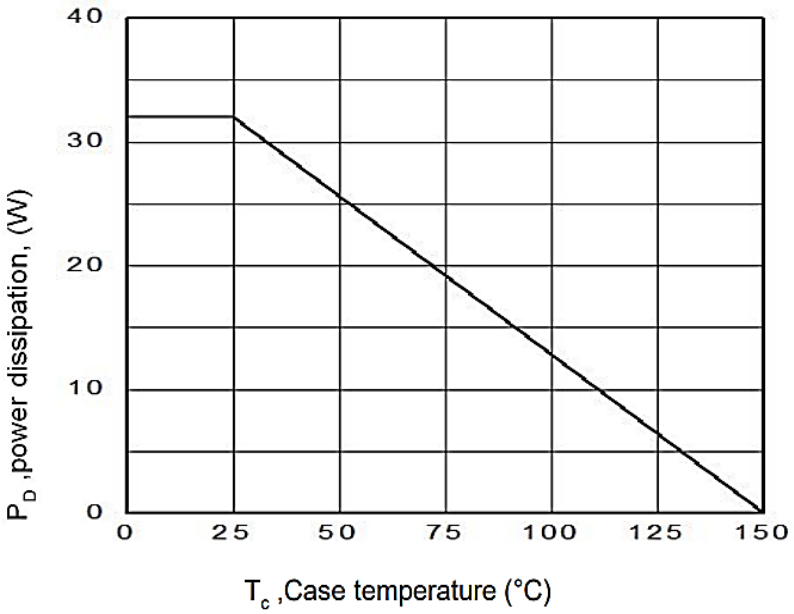


Figure 10. Power Dissipation vs. Temperature



ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

Figure 11. Continuous Drain Current vs. Temperature

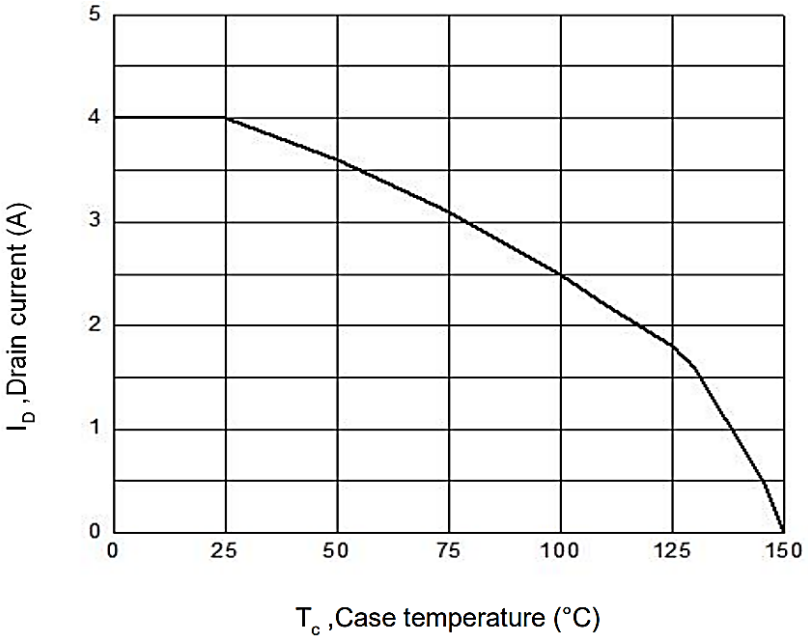
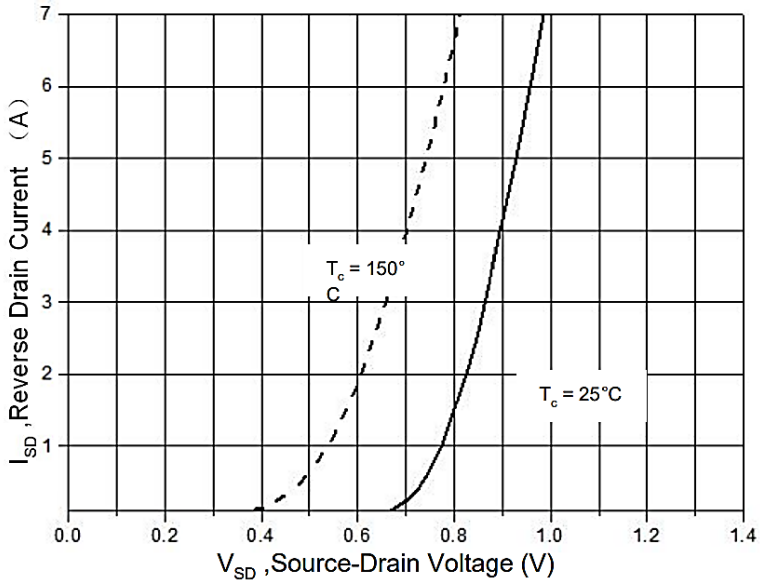
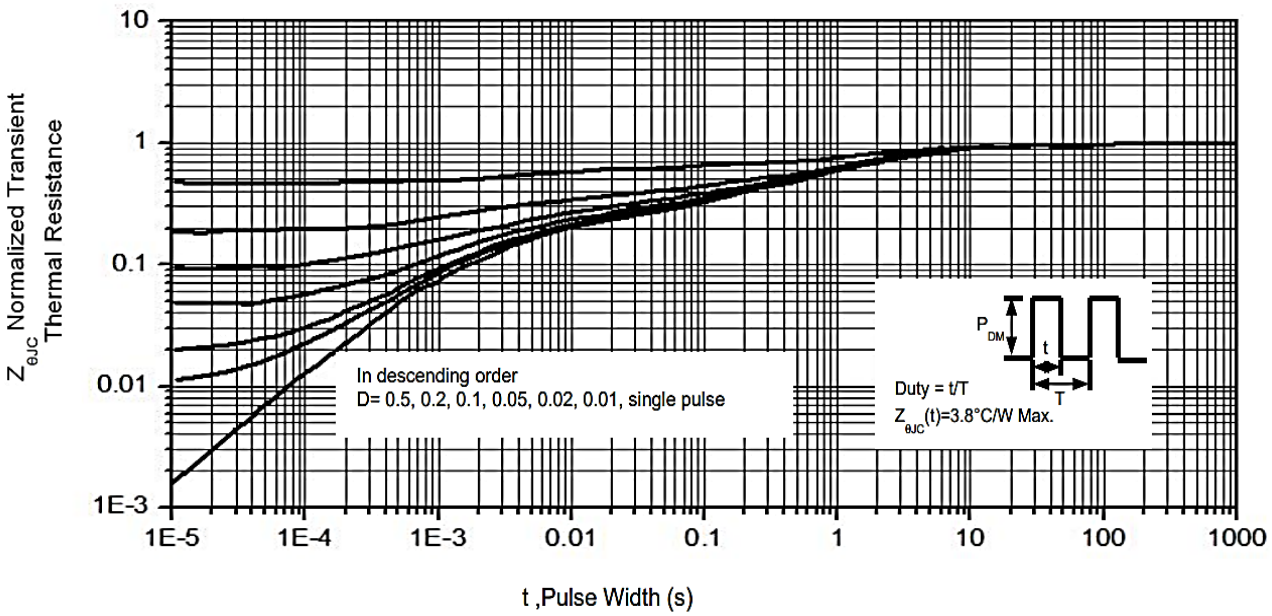


Figure 12. Body Diode Transfer Characteristics

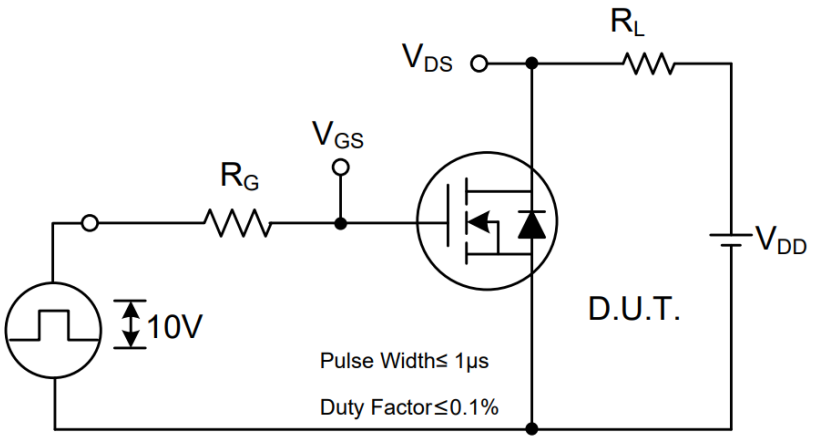


ELECTRICAL CHARACTERISTICS DIAGRAMS (For Reference Only)

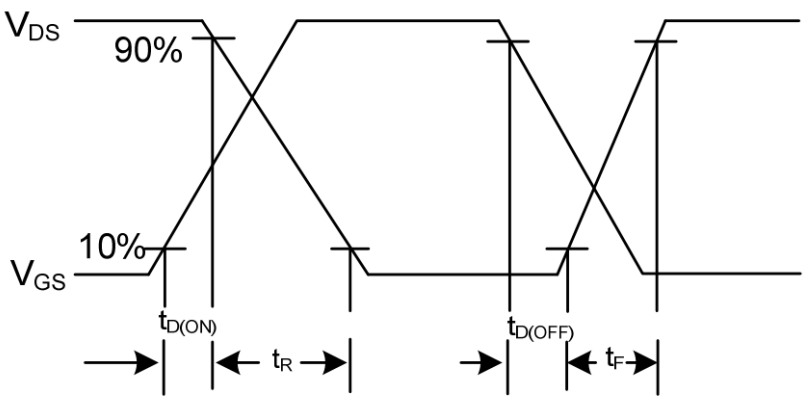
Figure 13. Transient Thermal Impendance,Junction to Case,



TEST CIRCUIT AND WAVEFORMS CURVE (For Reference Only)

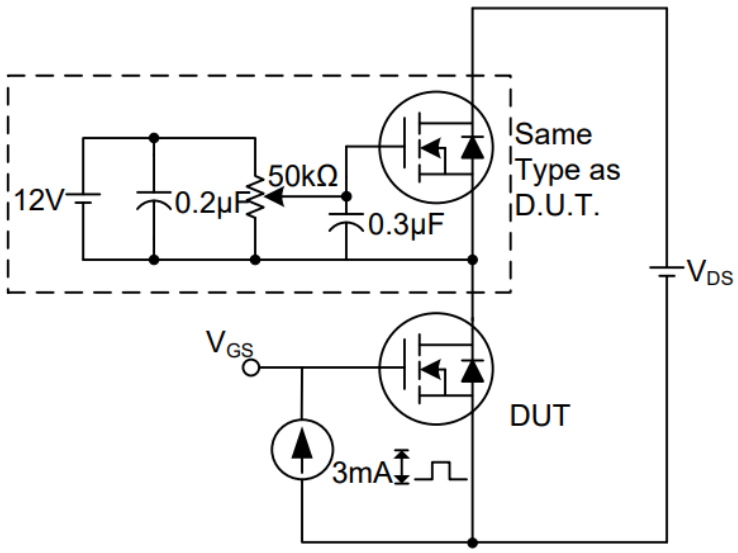


Switching Test Circuit

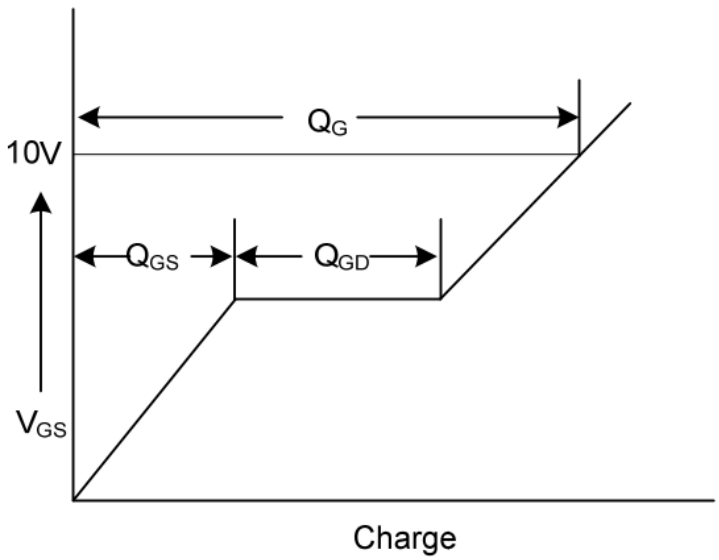


Switching Waveforms

TEST CIRCUIT AND WAVEFORMS CURVE (For Reference Only)

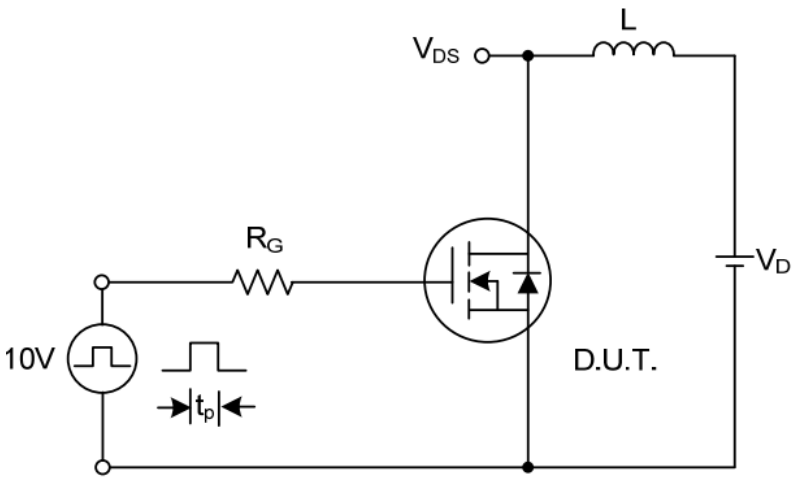


Gate Charge Test Circuit

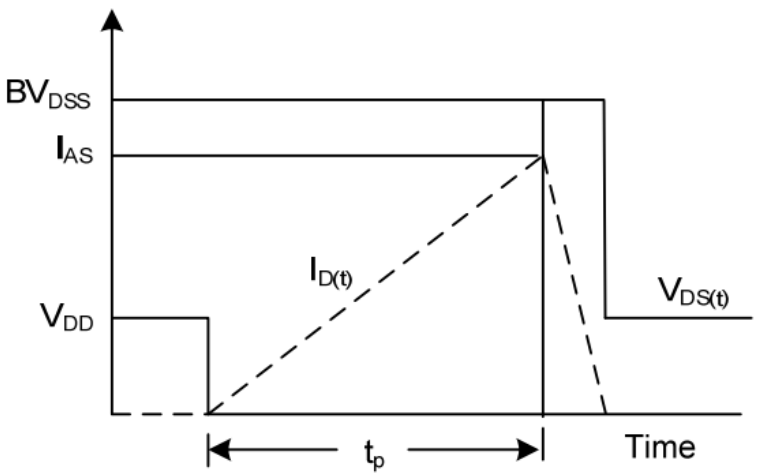


Gate Charge Waveform

TEST CIRCUIT AND WAVEFORMS CURVE (For Reference Only)



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

PACKAGE For Reference

Case Code	TO- 220F
SPQ/Tube	50 pcs
Qty. /Box	1000 pcs
G.W/Box	6.0 LBS

DISCLAIMER