Description

Tokmas Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

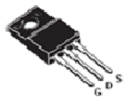
- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. Q_g = 39nC)
- 100% UIS tested
- RoHS compliant

Applications

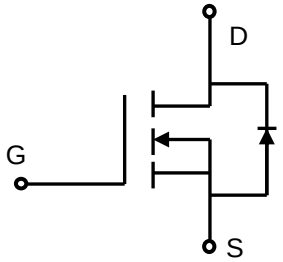
- Power faction correction (PFC).
- Switched mode power supplies (SMPS).
- Uninterruptible power supply (UPS).

Product Summary

V_{DS} @ $T_{j,max}$	700V
$R_{DS(on),max}$	0.18Ω
I_{DM}	60A
$Q_{g,typ}$	39nC



TO-220MF



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current (T_C = 25°C)	I_D	20	A
(T_C = 100°C)		13	A
Pulsed drain current [1]	I_{DM}	60	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	600	mJ
Avalanche energy, repetitive [3]	E_{AR}	0.4	mJ
Avalanche current, repetitive [3]	I_{AR}	20	A
Power Dissipation TO-247 (T_C = 25°C)	P_D	34	W
- Derate above 25°C		0.28	W/°C
Mounting torque To-220MF (M2.5 screws)		50	Ncm
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	20	A
Diode pulse current	$I_{S,pulse}$	60	A

Thermal Characteristics TO-220MF

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.6	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=0.25 mA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2	3.5	5	V
Drain cut-off current	I_{DSS}	V_{DS}=650 V, V_{GS}=0 V,				μA
		T_j = 25°C	-	-	1	
		T_j = 125°C	-	10	-	
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	50	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-50	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=10 A	-			
		T_j = 25°C	-	0.16	0.18	Ω
		T_j = 150°C	-	0.4	-	
Gate resistance	R_G	f=1 MHz, open drain	-	4.4	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V,	-	2637	-	pF
Output capacitance	C_{oss}	f = 1 MHz	-	1250	-	
Reverse transfer capacitance	C_{rss}		-	17	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 380V, I_D = 10A	-	23	-	ns
Rise time	t_r	R_G = 4.7Ω, V_{GS}=10V	-	33	-	
Turn-off delay time	$t_{d(off)}$		-	113	-	
Fall time	t_f		-	11	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480 V, I_D=10A,	-	10.3	-	nC
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10 V	-	13.7	-	
Gate charge total	Q_g		-	39	-	
Gate plateau voltage	$V_{plateau}$		-	5.5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=10A	-	1.0	-	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=20A,	-	390	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/μs	-	3.6	-	μC
Peak reverse recovery current	I_{rrm}		-	18	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.
2. I_{AS} = 5A, V_{DD} =60V, Starting T_j= 25°C.
3. Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

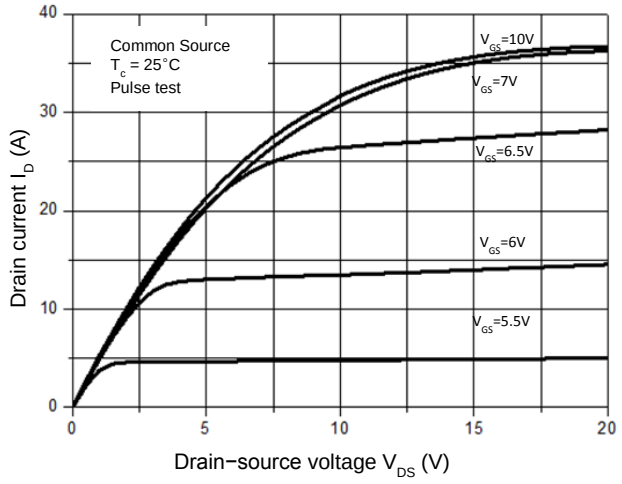


Figure 2. Transfer Characteristics

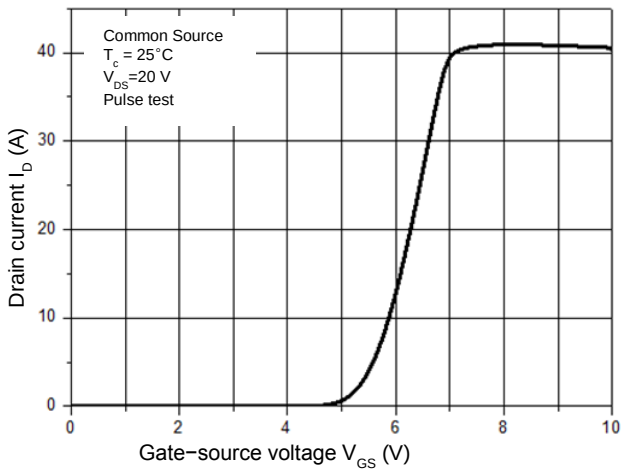


Figure 3. On-Resistance Variation vs. Drain Current

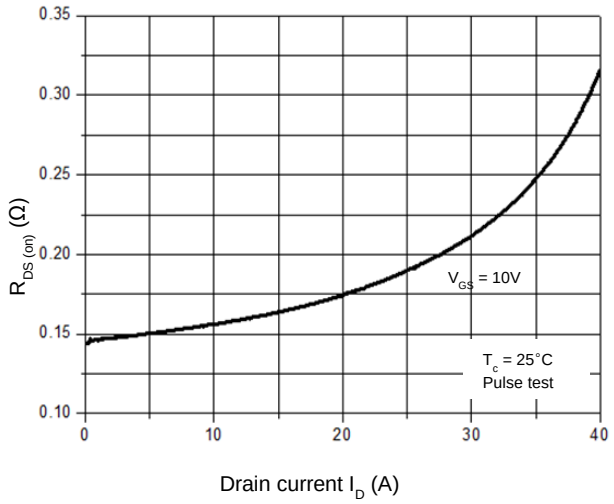


Figure 4. Threshold Voltage vs. Temperature

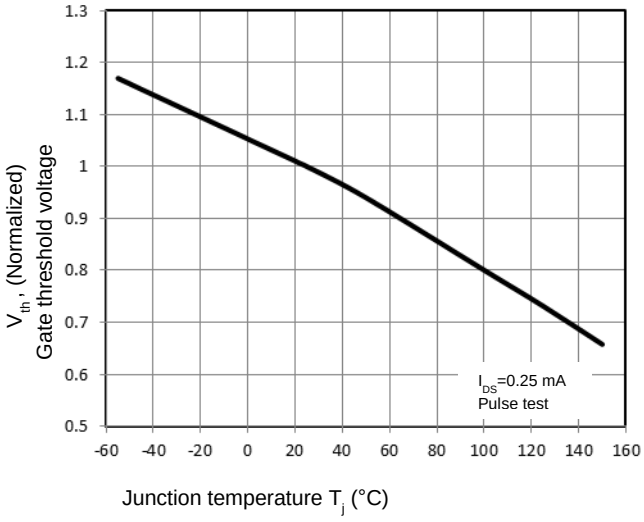


Figure 5. Breakdown Voltage vs. Temperature

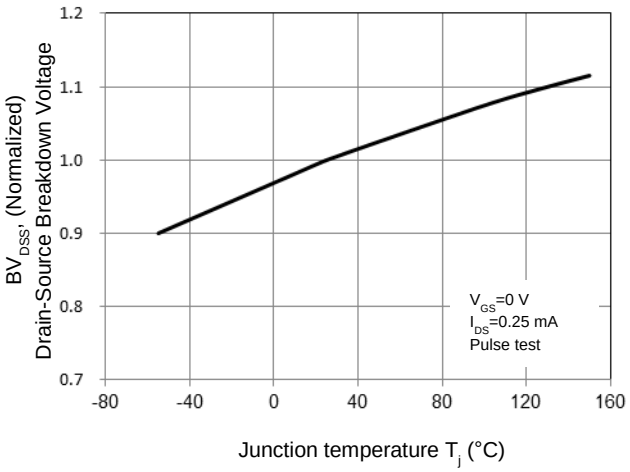


Figure 6. On-Resistance vs. Temperature

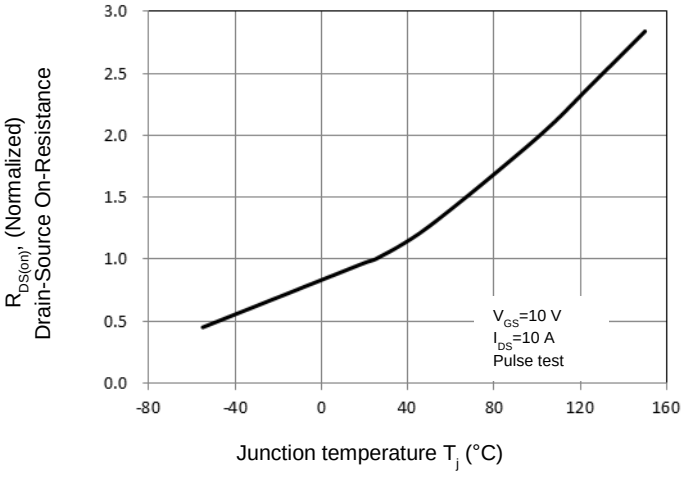


Figure 7. Capacitance Characteristics

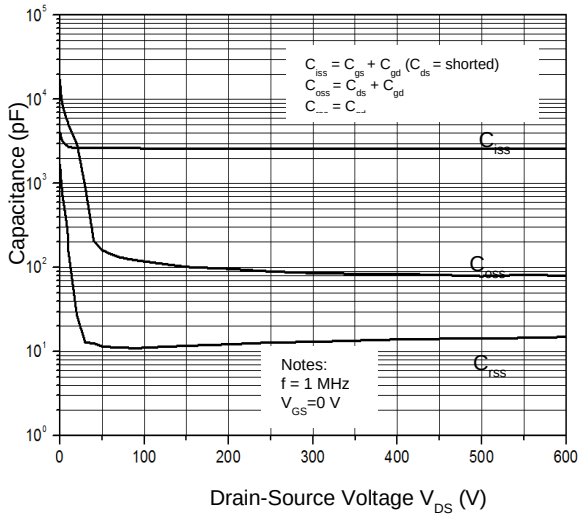


Figure 8. Gate Charge Characterist

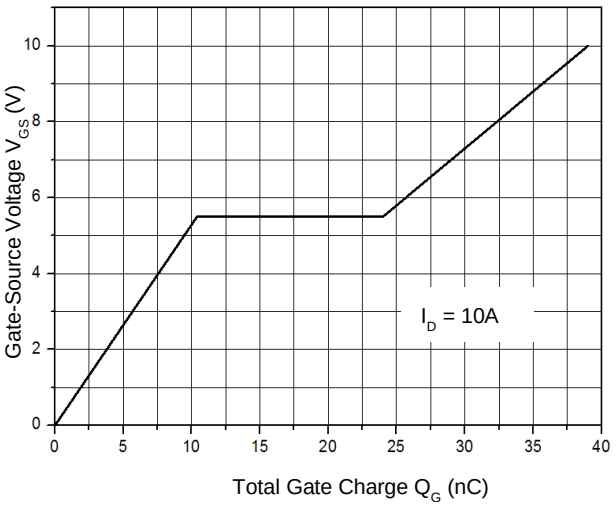


Figure 9. Maximum Safe Operating Area

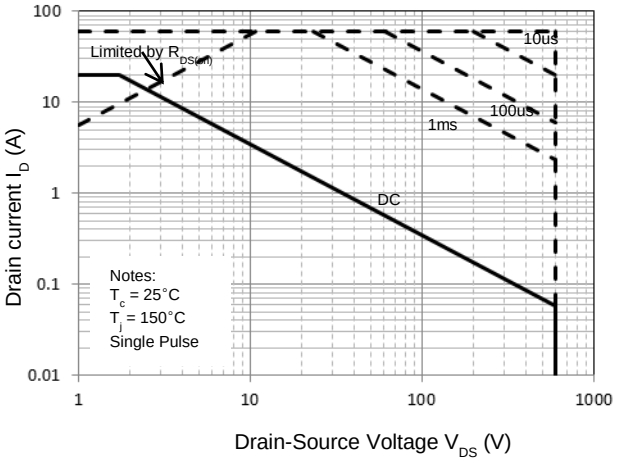


Figure 10. Power Dissipation vs. Temperature

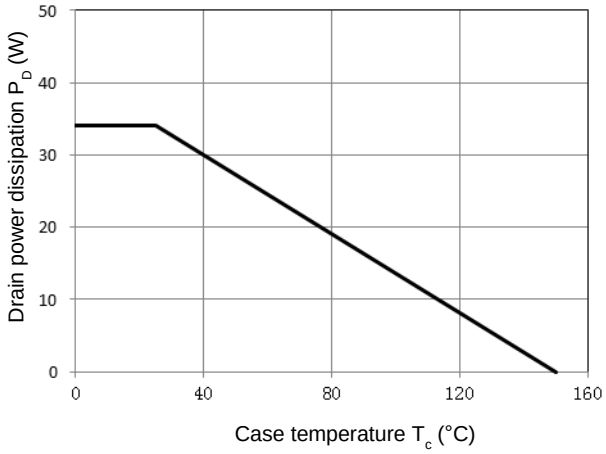
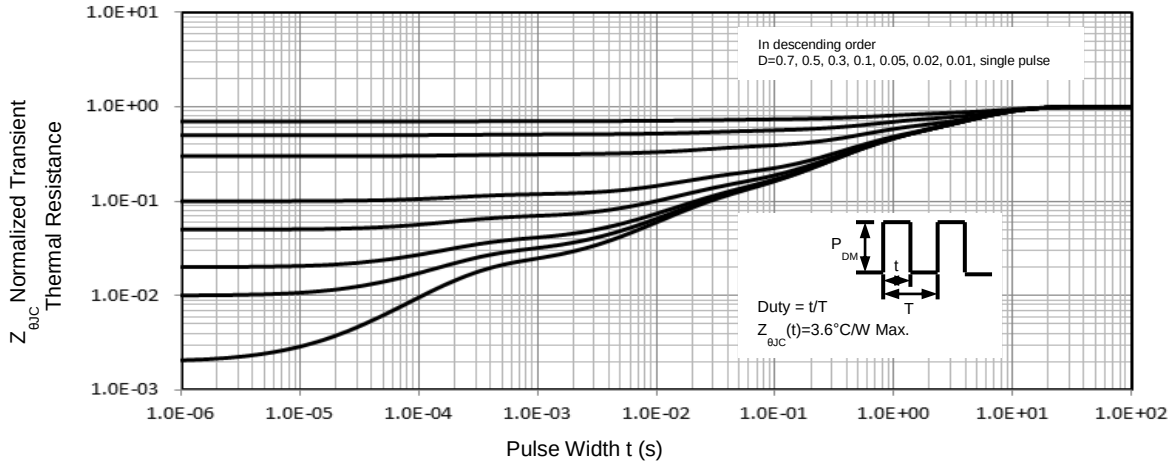
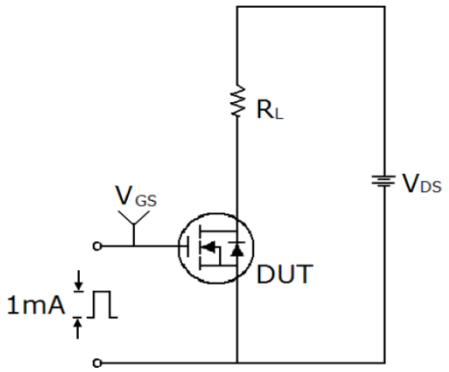
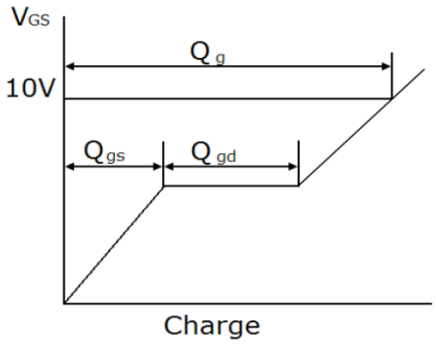


Figure 11. Transient Thermal Response Curve

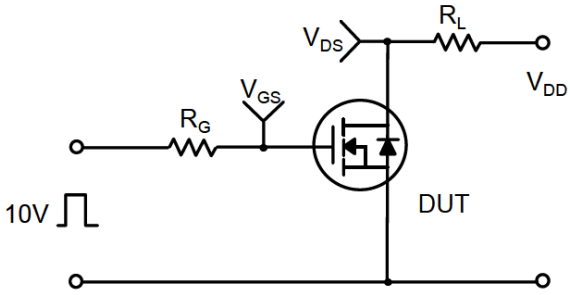


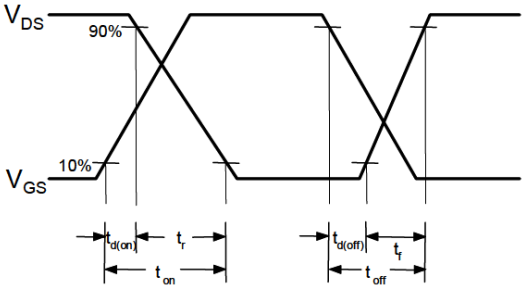
Gate Charge Test Circuit & Waveform





Switching Test Circuit & Waveforms





Unclamped Inductive Switching Test Circuit & Waveforms