TIDC Technology

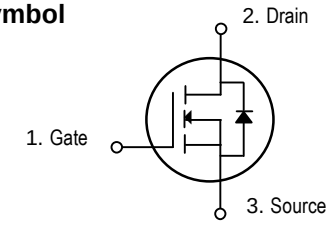
TYP3205

N-Channel MOSFET

Features

- $R_{DS(on)}$ (Max 0.008 Ω) @ V_{GS}=10V
- Performance and Cost Competitive
- Advanced Trench Technology
- Low $R_{DS(on)}$ Minimizes Conduction Loss
- Low Capacitance Minimizes Driver Loss
- Optimized Gate Charge Minimizes Switching Loss

Symbol



General Description

This low voltage Power MOSFET is produced using TIDC's advanced high density trench DMOS technology. This latest technology has been especially designed to minimize on-state resistance and parasitic capacitance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switching applications、DC/DC conversion、CPU power delivery and Synchronous rectification

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain to Source Voltage	60	V
I_D	Continuous Drain Current (@Tc=25 °C) (Note 3)	110	A
	Continuous Drain Current (@Tc=100 °C) (Note 3)	70	A
I_{DM}	Drain Current Pulsed (Note 1)	440	A
V_{GS}	Gate to Source Voltage	±20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	800	mJ
I_{AS}	Pulsed Avalanche Energy (Note 1)	Shown in fig. 9	A
P_D	Total Power Dissipation (@Tc=25 °C)	150	W
	Linear Derating Factor	1.0	W/°C
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	-55 to +175	°C
T_L	Maximum Lead Tempereture for soldering purpose, 1/8 from Case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	1.0	°C/W
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink	-	0.5	-	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	62.5	

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Electrical Characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	60	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficience	I_D=250uA, referenced to 25°C	-	0.03	-	V/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=48V, V_{GS}=0V	-	-	1	uA
		V_{DS}=48V, V_{GS}=0V, T_C=125 °C	-	-	100	uA
I_{GSS}	Gate-Source Leakage, Forward	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
	Gate-Source Leakage, Reverse	V_{GS}=-20V, V_{DS}=0V	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-state Resistance	V_{GS}=10V, I_D=24A	-	6.0	8.0	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	3400	-	pF
C_{oss}	Output Capacitance		-	435	-	
C_{rss}	Reverse Transfer Capacitance		-	150	-	
Q_g	Total Gate Charge	V_{DS}=30V, V_{GS}=10V, I_D=38A, (Note 4,5)	-	50	-	nC
Q_{gs}	Gate-Source Charge		-	21	-	
Q_{gd}	Gate-Drain Charge (Miller Charge)		-	14	-	
$t_{d(on)}$	Fall Time	V_{DD}=30V, I_D=38A, R_G=2.5Ω (Note 4,5)	-	14	-	ns
t_r	Rise Time		-	43	-	
$t_{d(off)}$	Turn-off Time		-	31	-	
t_f	Fall Time		-	11	-	

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Continuout Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	110	A
I_{SM}	Pulsed Source Current		-	-	380	
Qrr	Reverse Recovery Charge	If=38A, di/dt=100 A/us		74		nC
trr	Reverse Recovery time			52		ns
V_{SD}	Diode Forward Voltage	I_S=30A, V_{GS}=0V	-	-	1.2	V

Notes
1. Repeativity rating: pulse width limited by junction temperature
2. L = 1mH, I_{AS} = 40A, V_{DD} = 25V, R_G = 25Ω, Starting Tj = 25°C
3. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A
4. Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially independent of operating temperature.

Typical Charateristics

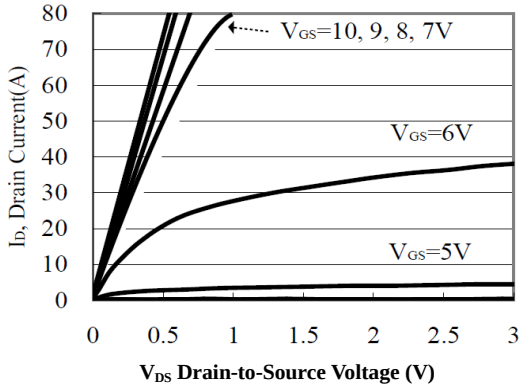


Figure 1. Typical Output Characteristics

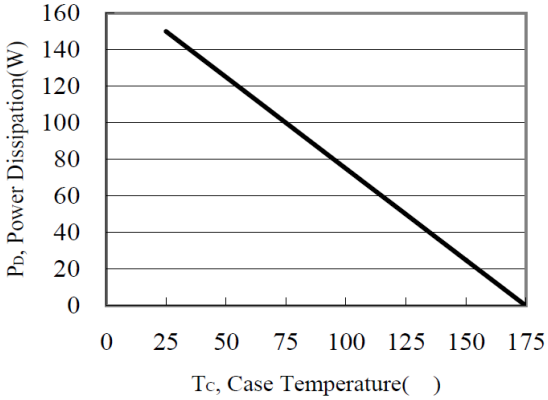


Figure 2. Maximum Power Dissipation v.s. Case Temperature

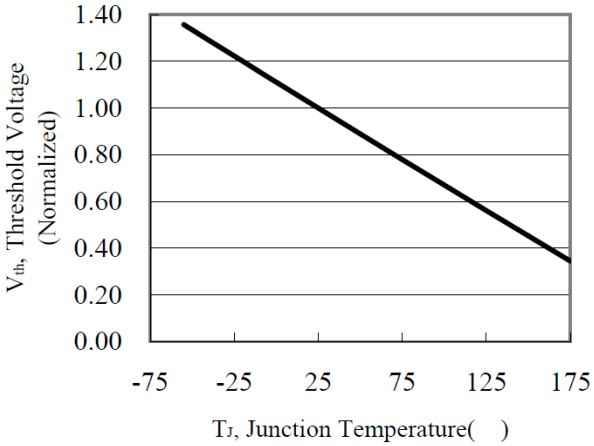


Figure 3. Threshold Voltage v.s. Junction Temperature

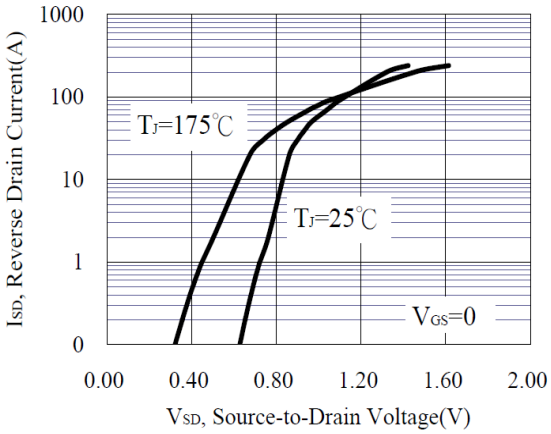


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

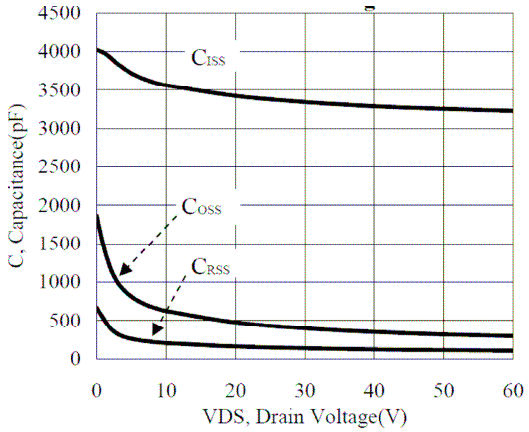


Figure 5. Capacitance Characteristics

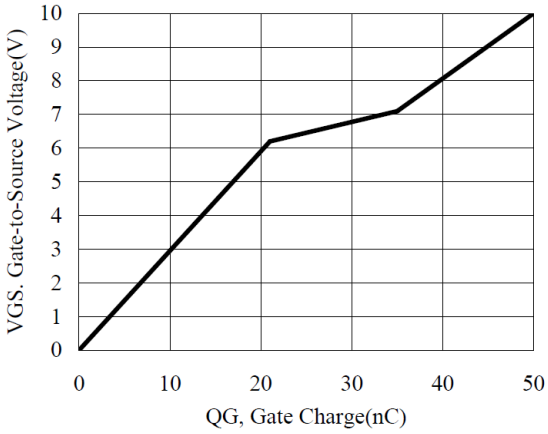


Figure 6. Gate Charge Characteristics

Typical Charateristics (Continued)

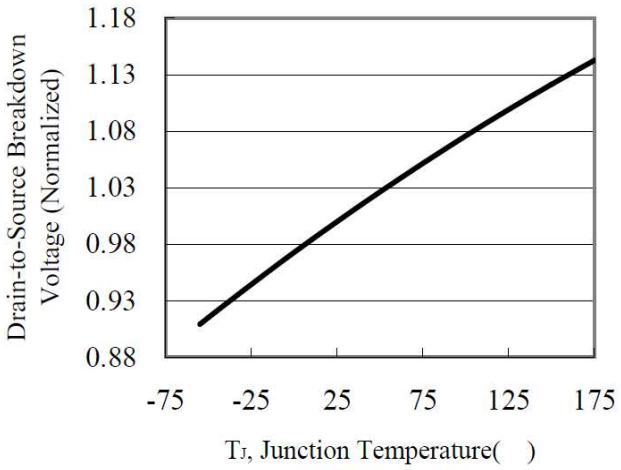


Figure 7. Breakdown Voltage vs Temperature

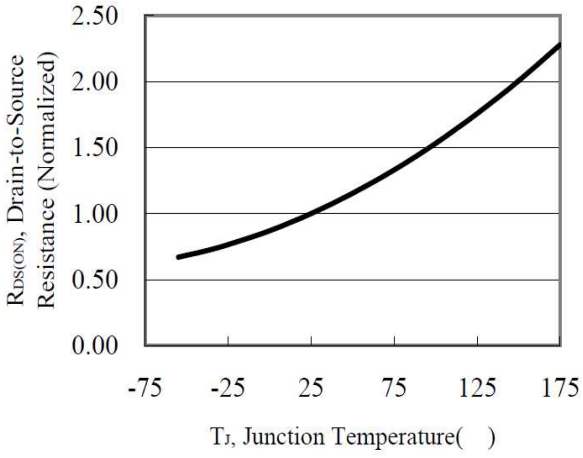


Figure 8. On-Resistance Variation vs Temperature

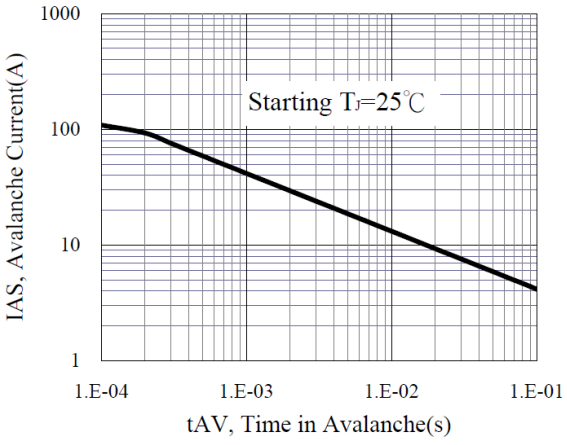


Figure 9. Unclamped Inductive Switching Capability

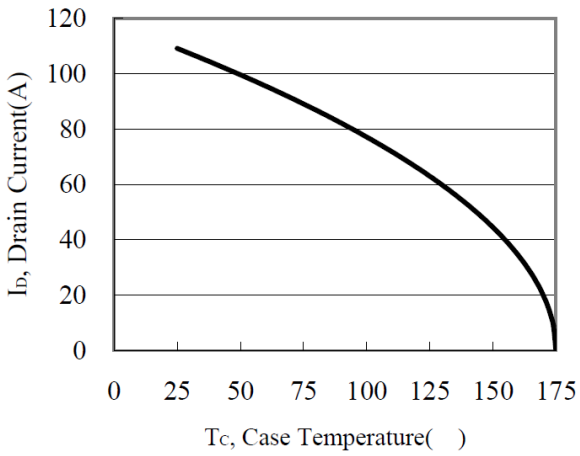
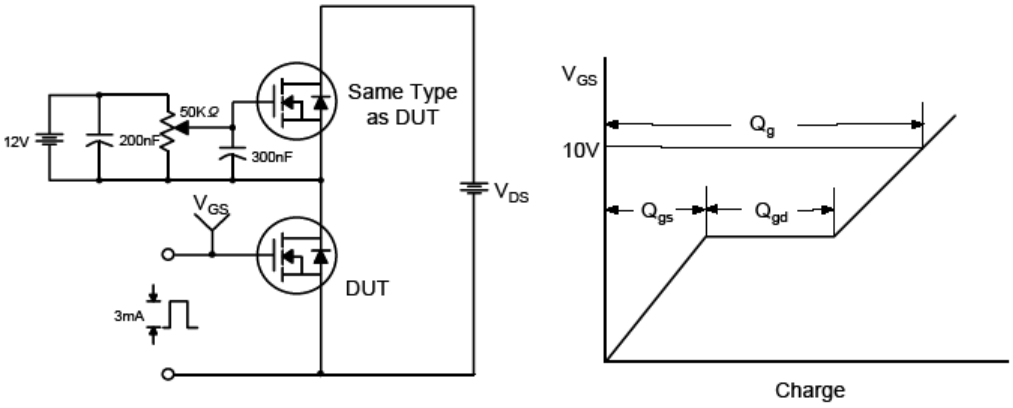
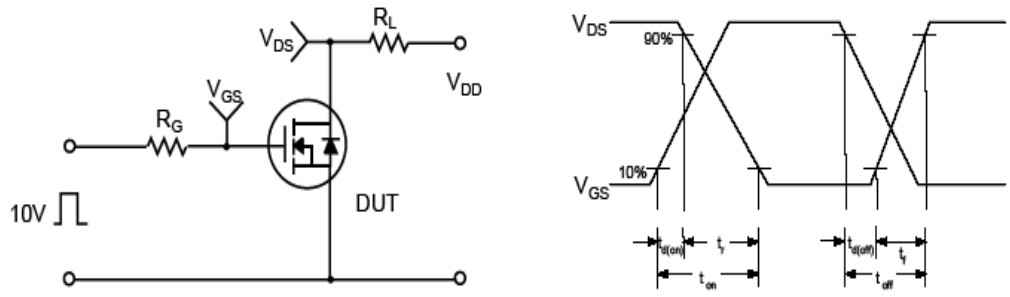


Figure 10. Maximum Drain Current vs Case Temperature

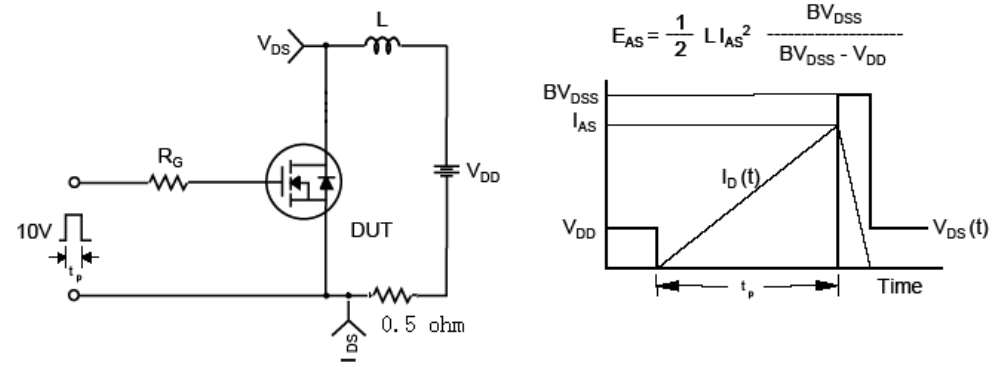
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms