

Silicon N-Channel Power MOSFET

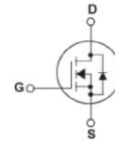
Features:

- Fast Switching
- ESD Improved Capability
- Low Gate Charge (Typical Data: 140nC)
- Low Reverse transfer capacitances(Typical: 80pF)
- 100% Single Pulse avalanche energy Test

Applications:

- Power switch circuit of PC POWER

$V_{DSS}(T_C=150^{\circ}C)$	500	V
I_D	50	A
$P_D(T_C=25^{\circ}C)$	250	W
$R_{DS(ON)}$	0.082	Ω



Absolute (Tc=25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	500	V
I_D	Continuous Drain Current	50	A
	Continuous Drain Current $T_C=100^{\circ}C$	20	A
I_{DM}^{a1}	Pulsed Drain Current	120	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy	3500	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	400	mJ
I_{AR}^{a1}	Avalanche Current	8.9	A
dv/dt^{a2}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	250	W
	Derating Factor above 25°C	2	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T_L	Maximum Temperature for Soldering	300	°C

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.46	°C/ W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/ W

Electrical Characteristics (Tc= 25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	--	--	V

Silicon N-Channel Power MOSFET

I _{DSS}	Drain to Source Leakage Current	V _{DS} =500V, V _{GS} =0V, T _a =25°C	--	--	1.0	μA
		V _{DS} =400V, V _{GS} =0V, T _a =125°C	--	--	100	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+20V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-20V	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =25A	--	0.082	0.1	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.0	V
g _{fs}	Forward Trans conductance	V _{DS} =30V, I _D =15A	--	20	--	S

Pulse width < 380μs; duty cycle < 2%.

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} =0V V _{DS} =25V f=1.0MHz	--	8260	--	pF
C _{oss}	Output Capacitance		--	730	--	
C _{rss}	Reverse Transfer Capacitance		--	80	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =30A, V _{DD} =250V V _{GS} =10V, R _g =25Ω	--	68	--	ns
t _r	Rise Time		--	120	--	
t _{d(OFF)}	Turn-Off Delay Time		--	485	--	
t _f	Fall Time		--	145	--	
Q _g	Total Gate Charge	I _D =30A, V _{DD} =250V V _{GS} =10V	--	140	--	nC
Q _{gs}	Gate to Source Charge		--	22	--	
Q _{gd}	Gate to Drain ("Miller")Charge		--	48	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I _{SD}	Continuous Source Current (Body Diode)		--	--	30	A
I _{SM}	Maximum Pulsed Current (Body Diode)		--	--	120	A
V _{SD}	Diode Forward Voltage	I _S =50A, V _{GS} =0V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =50A, T _j =25°C	--	485	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs, V _{GS} =0V	--	4.8	--	μC

a1: Repetitive rating; pulse width limited by maximum junction temperature

a2: I_{SD}=30A, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DS}, Start T_J=25°C

Silicon N-Channel Power MOSFET

Characteristics Curve:

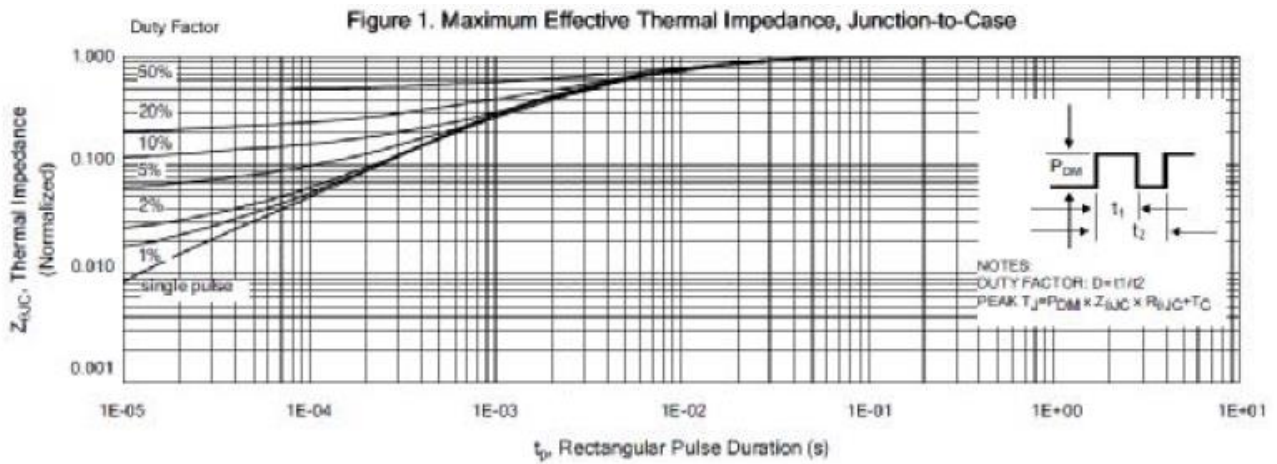


Figure 2. Maximum Power Dissipation vs Case Temperature

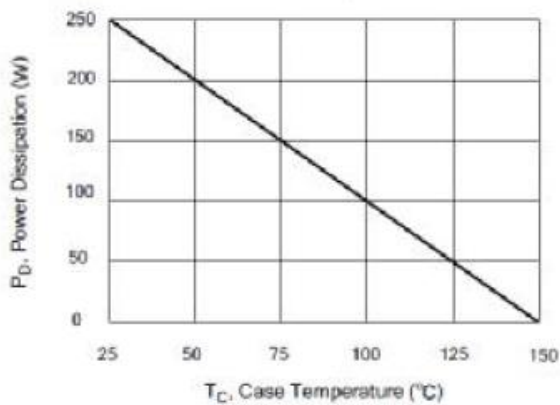


Figure 3. Maximum Continuous Drain Current vs Case Temperature

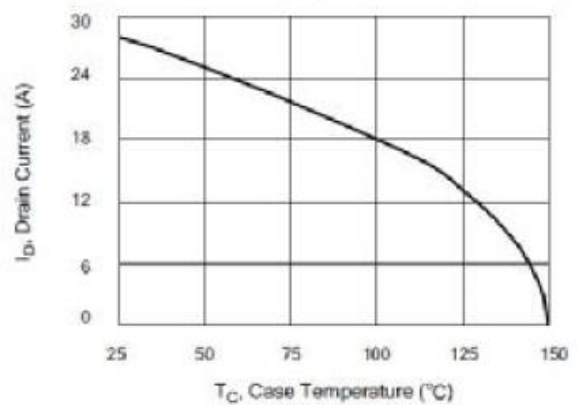


Figure 4. Typical Output Characteristics

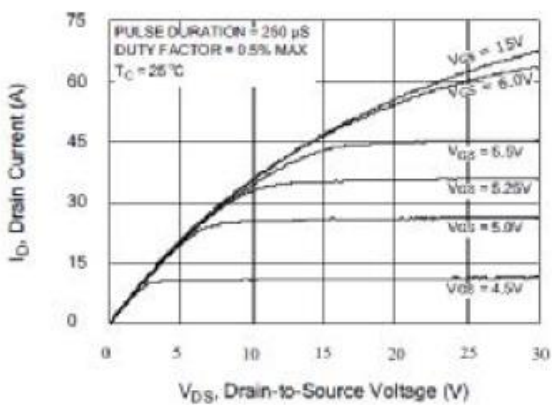
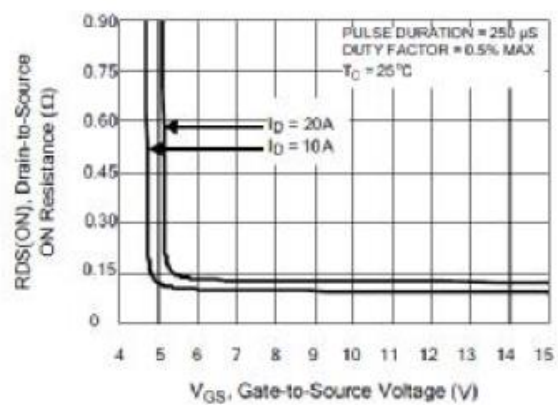


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current



Silicon N-Channel Power MOSFET

Figure 6. Maximum Peak Current Capability

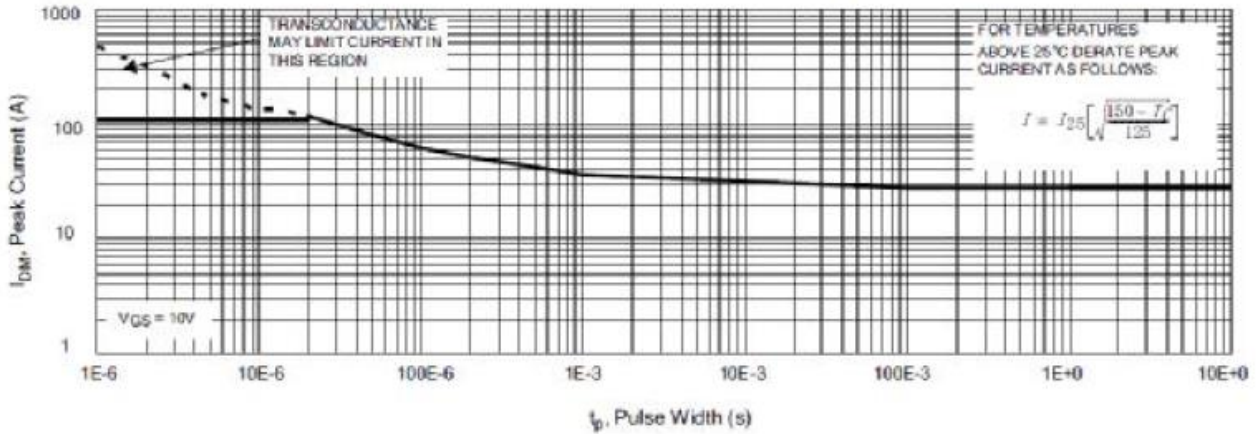


Figure 7. Typical Transfer Characteristics

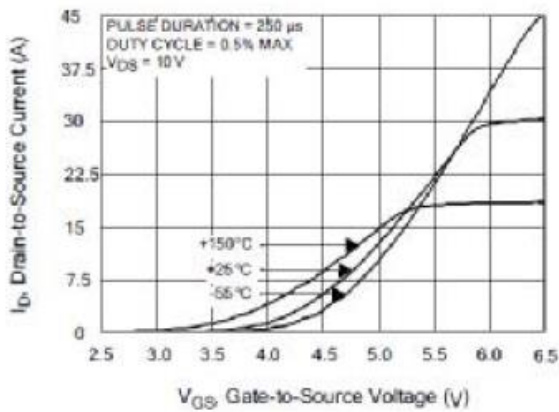


Figure 8. Unclamped Inductive Switching Capability

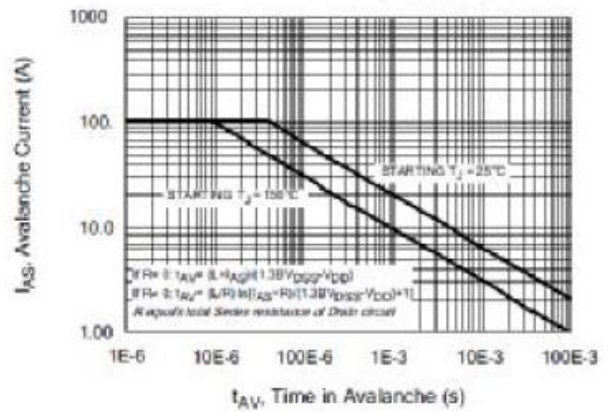


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

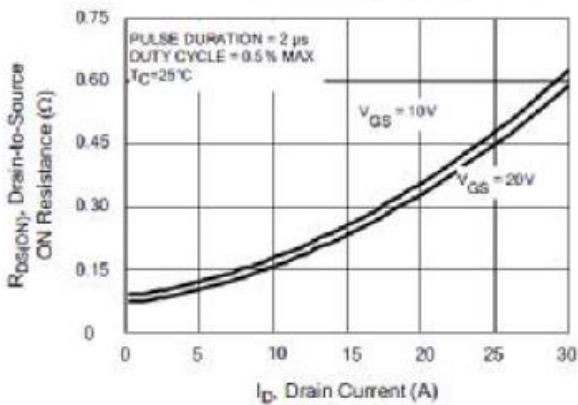
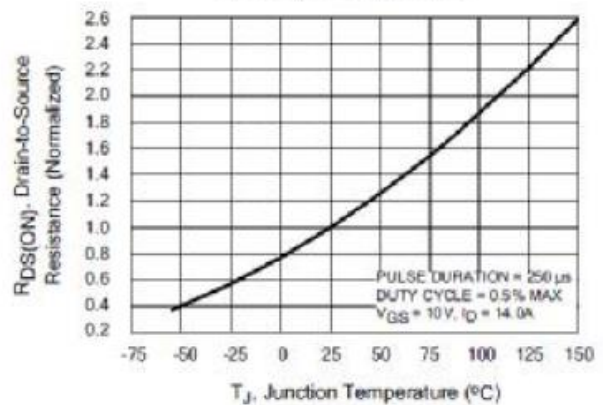


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



Silicon N-Channel Power MOSFET

Figure 11. Typical Breakdown Voltage vs Junction Temperature

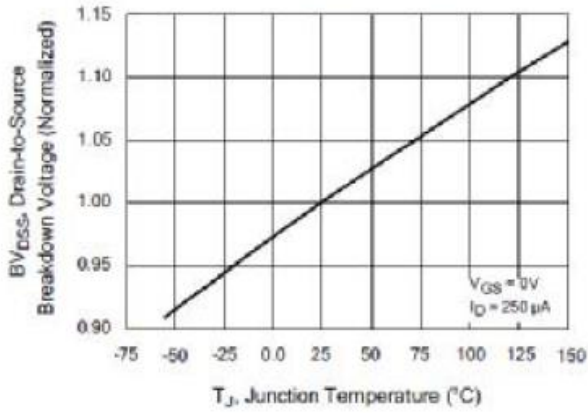


Figure 12. Typical Threshold Voltage vs Junction Temperature

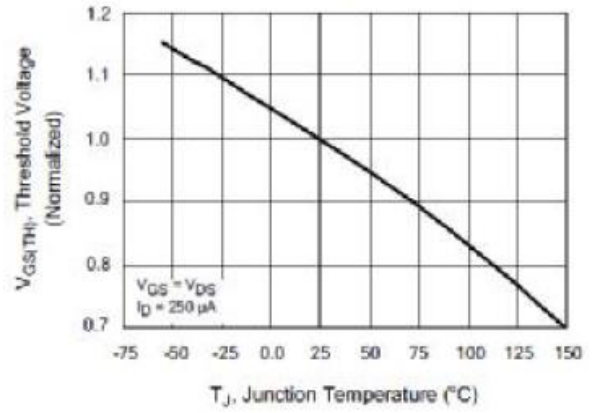


Figure 13. Maximum Forward Bias Safe Operating Area

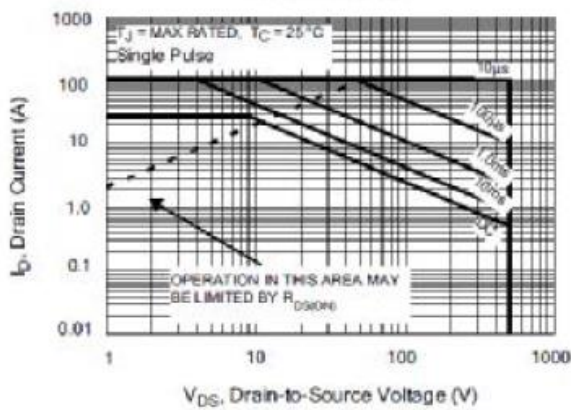


Figure 14. Typical Capacitance vs

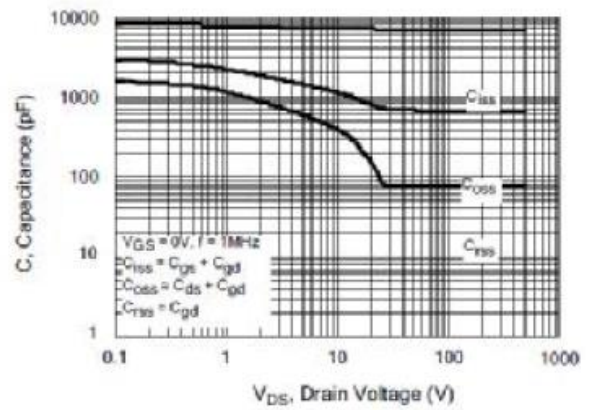


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

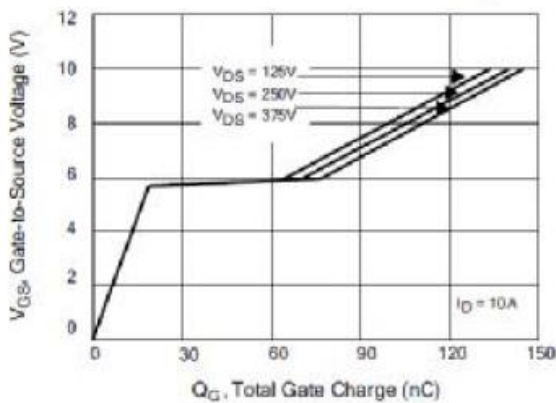
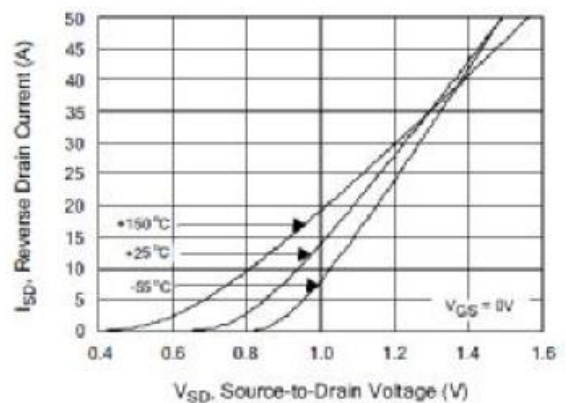
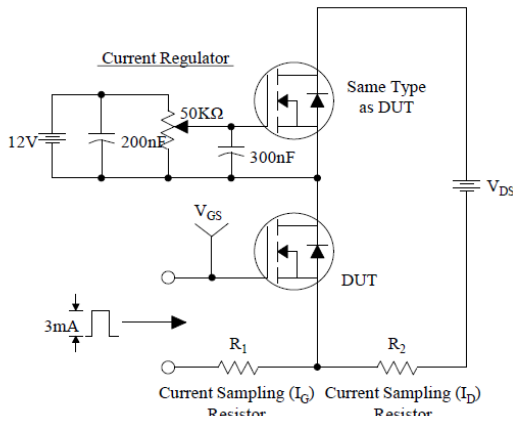


Figure 16. Typical Body Diode Transfer Characteristics

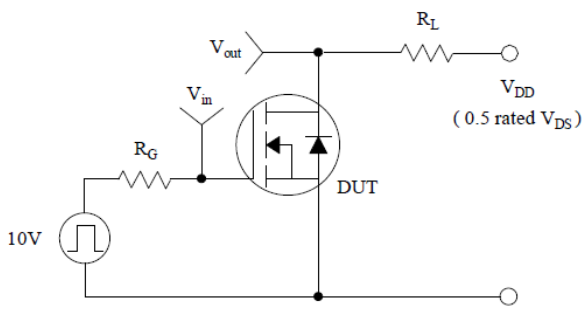


Silicon N-Channel Power MOSFET

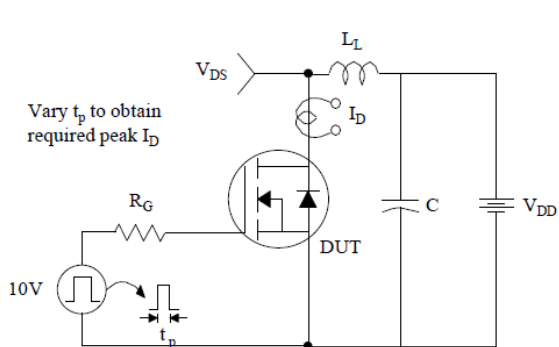
Test Circuit & Waveform



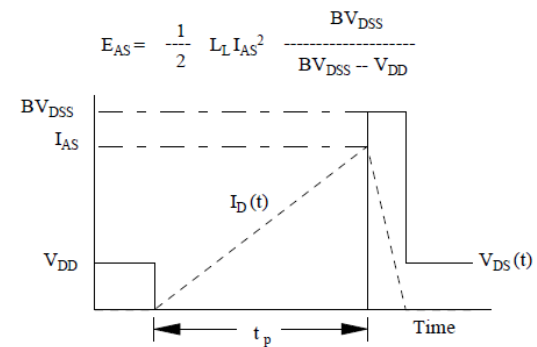
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

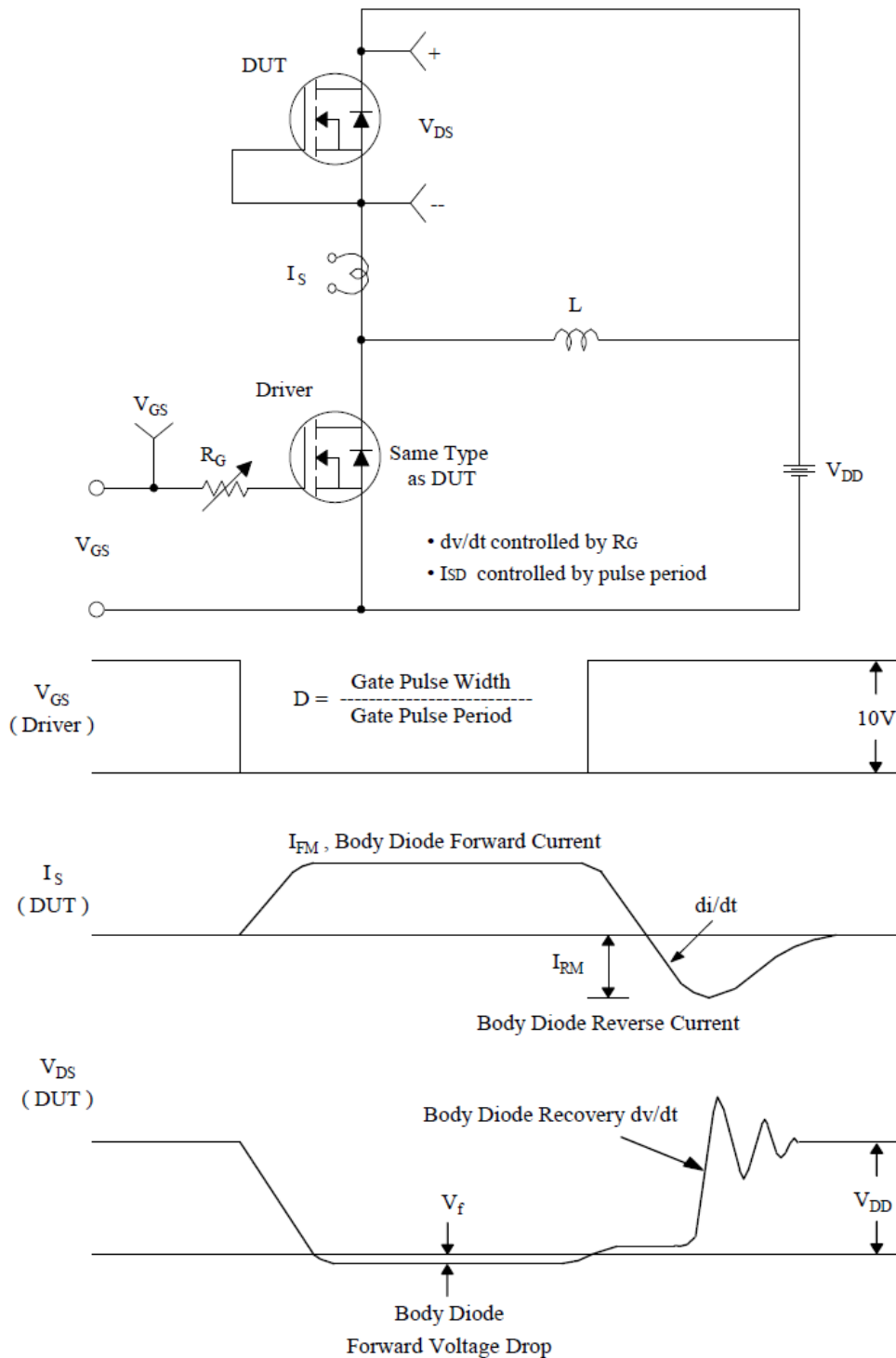


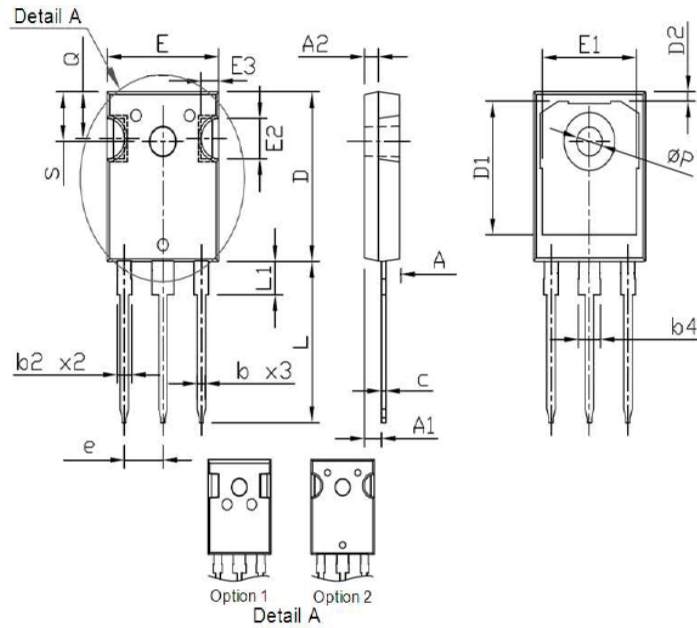
Unclamped Inductive Switching Test Circuit & Waveforms



Silicon N-Channel Power MOSFET

Test Circuit & Waveform



Silicon N-Channel Power MOSFET
TO247 PACKAGE OUTLINE


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.70	5.30	0.185	0.209
A1	2.20	2.60	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	1.04	1.33	0.041	0.052
b2	1.90	2.41	0.075	0.095
b4	2.87	3.43	0.113	0.135
c	0.55	0.70	0.022	0.028
D	20.70	21.30	0.815	0.839
D1	16.25	17.65	0.640	0.695
D2	0.51	1.40	0.020	0.055
e	5.44 BSC.		0.214 BSC.	
E	15.50	16.30	0.610	0.642
E1	13.08	14.16	0.515	0.557
E2	3.80	5.49	0.150	0.216
E3	1.00	2.75	0.039	0.108
L	19.72	20.32	0.776	0.800
L1	3.85	4.50	0.152	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	6.04	6.30	0.238	0.248

*Silicon N-Channel Power MOSFET***Disclaimers**

JIAEN Semiconductor Co., Ltd reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to JIAEN's terms and conditions supplied at the time of order acknowledgement.

JIAEN Semiconductor Co., Ltd warrants performance of its hardware products to the specifications at the time of sale, Testing, reliability and quality control are used to the extent JIAEN deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

JIAEN Semiconductor Co., Ltd does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using JIAEN's components. To minimize risk, customers must provide adequate design and operating safeguards.

JIAEN Semiconductor Co., Ltd does not warrant or convey any license either expressed or implied under its parent rights, nor the rights of others. Reproduction of information in JIAEN's datasheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice. JIAEN Semiconductor Co., Ltd is not responsible or liable for such altered documentation.

Resale of JIAEN's products with statements different from or beyond the parameters stated by JIAEN Semiconductor Co., Ltd for that product or service voids all express or implied warranties for the associated JIAEN's product or service and is unfair and deceptive business practice. JIAEN Semiconductor Co., Ltd is not responsible or liable for any such statements.