



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHA50N25A

主要参数 MAIN CHARACTERISTICS

ID	40A
VDSS	250V
Rdson-typ (@Vgs=10V)	65mΩ
Qg-typ	62nC

用途 APPLICATIONS

高频开关电源	High efficiency switch mode power supplies
逆变电源	Power management for inverter systems

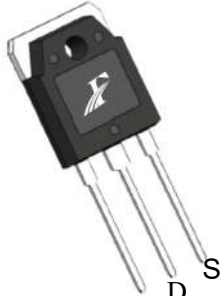
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 2.5pF)	Low Crss (typical 2.5pF)
开关速度快	Fast switching
100%经过雪崩测试	100% avalanche tested
高抗 dv/dt 能力	Improved dv/dt capability
RoHS 产品	RoHS product

封装形式 Package

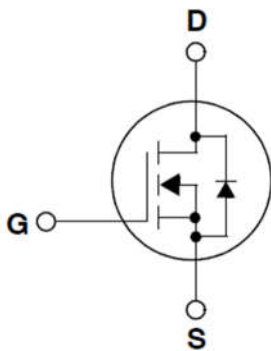


TO-247



TO-3PN
FHA series

等效电路 Equivalent Circuit



绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项目 Parameter	符号 Symbol	数值 Value	单位 Unit
		FHA50N25A	
最高漏极-源极直流电压 Drain-Source Voltage	V _{DS}	250	V
连续漏极电流* Drain Current -continuous *	I _D (T _C =25℃)	40	A
	I _D (T _C =100℃)	26	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	I _{DM}	160	A
最高栅源电压 Gate-Source Voltage	V _{GS}	±30	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E _{AS}	2000	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I _{AR}	20	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	E _{AR}	11	mJ
二极管反向恢复最大电压变化速率 (注 3) Peak Diode Recovery dv/dt (note 3)	dv/dt	5.0	V/ns
耗散功率 Power Dissipation	P _D (T _C =25℃)	310	W
	-Derate above 25℃	2.48	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T _J , T _{STG}	150, -55 to 150	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	300	℃

*漏极电流由最高结温限制

*Drain current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

项目 Parameter	符号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off –Characteristics						
漏－源击穿电压 Drain-Source Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	250	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /Δ T _J	I _D =250μA, referenced to 25℃	-	0.25	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =250V,V _{GS} =0V, T _C =25℃	-	-	1	μA
		V _{DS} =200V, T _C =125℃	-	-	10	μA
栅极体漏电流 Gate-body leakage current	I _{GSS} (F/R)	V _{DS} =0V, V _{GS} =±30V	-	-	±100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250μA	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =20A	-	65	80	mΩ
正向跨导 Forward Transconductance	g _{fs}	V _{DS} = 40V, I _D =20A (note 4)	-	27	-	S
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	-	3700	-	pF
输出电容 Output capacitance	C _{oss}		-	360	-	
反向传输电容 Reverse transfer capacitance	C _{rss}		-	2.5	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	t _{d(on)}	V _{DS} =125V, I _D =40A, R _G =15Ω V _{GS} =10V (note 4, 5)	-	80	-	ns
上升时间 Turn-On rise time	t _r		-	620	-	ns
延迟时间 Turn-Off delay time	t _{d(off)}		-	140	-	ns
下降时间 Turn-Off Fall time	t _f		-	183	-	ns
栅极电荷总量 Total Gate Charge	Q _g	V _{DS} =200V , I _D =40A , V _{GS} =10V (note 4, 5)	-	62	-	nC
栅－源电荷 Gate-Source charge	Q _{gs}		-	22	-	nC
栅－漏电荷 Gate-Drain charge	Q _{gd}		-	38	-	nC
漏－源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
正向最大连续电流 Maximum Continuous Drain -Source Diode Forward Current	I _S		-	-	40	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}		-	-	160	A
正向压降 Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
反向恢复时间 Reverse recovery time	t _{rr}	V _{GS} =0V, I _S =40A ,dI _F /dt=100A/μs (note 4)	-	230	-	ns
反向恢复电荷 Reverse recovery charge	Q _{rr}		-	2150	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHA50N25A	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	0.40	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	62.5	℃/W

注释:

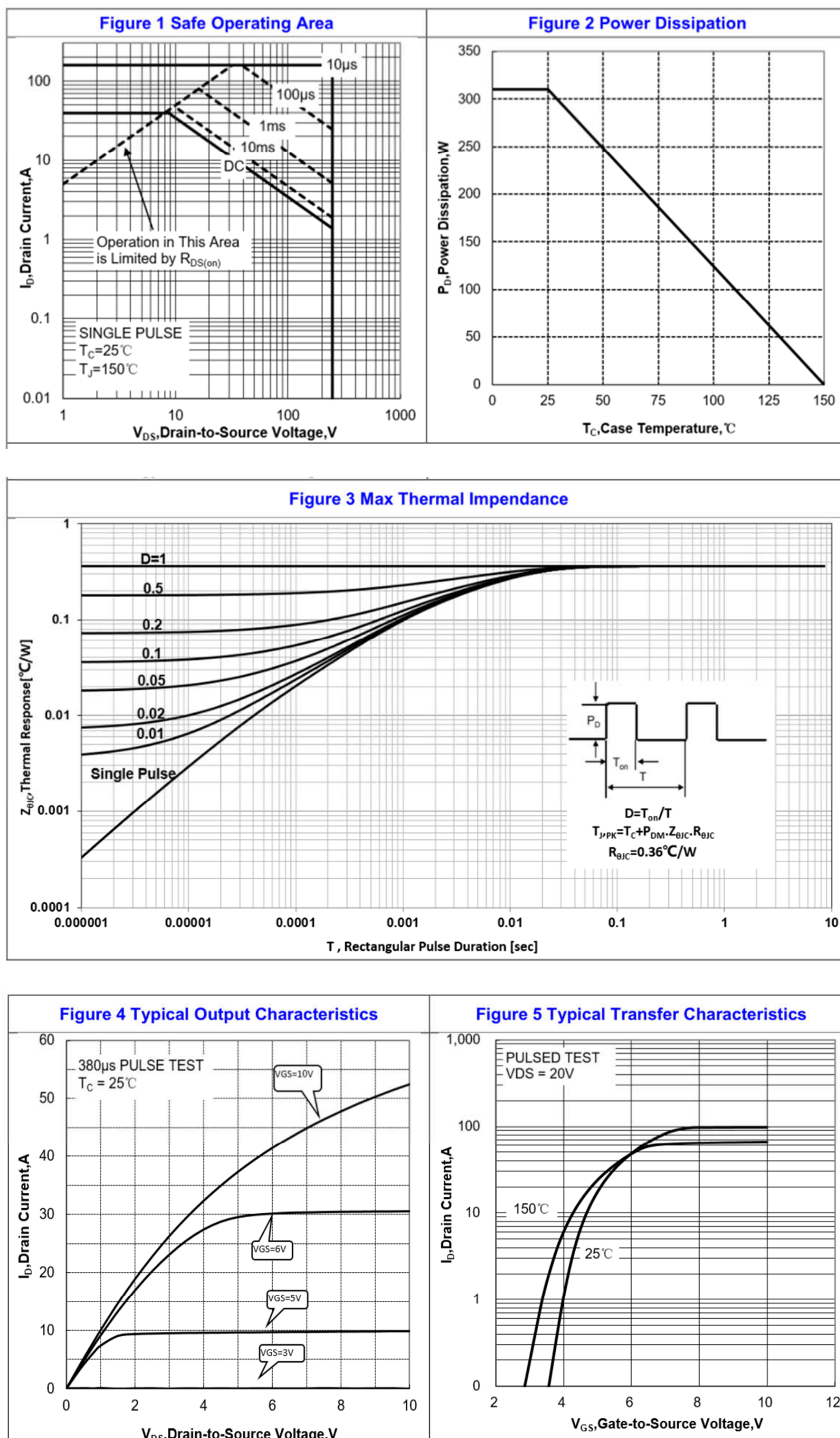
- 1: 脉冲宽度由最高结温限制
- 2: L=10mH, IAS=20A, VDD=50V, RG=25 Ω,起始结温 TJ=25℃
- 3: ISD ≤40A,di/dt ≤300A/μs,VDD≤BV_{DSS},起始结温 TJ=25℃
- 4: 脉冲测试: 脉冲宽度 ≤300μs,占空比≤2%
- 5: 基本与工作温度无关

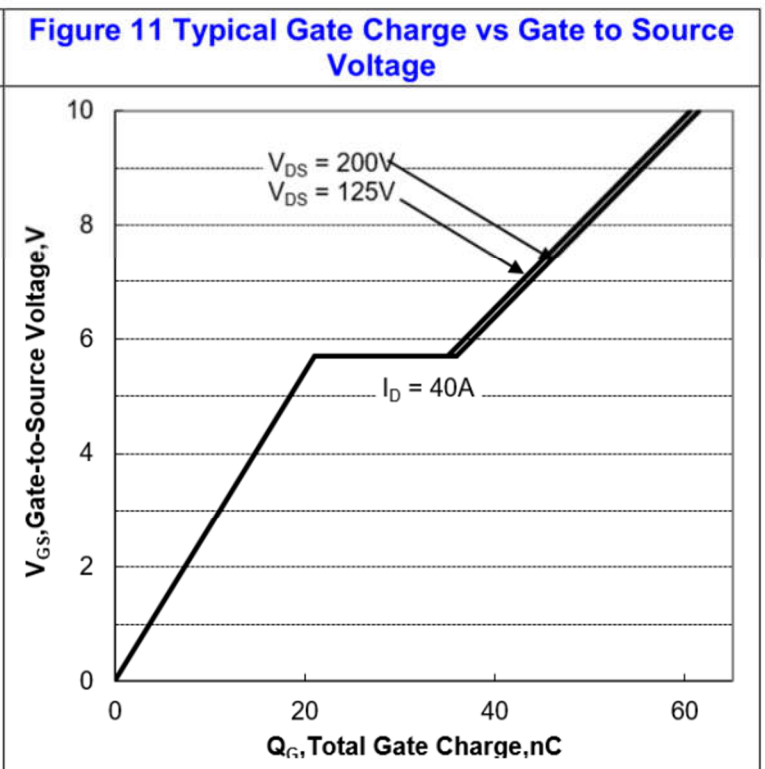
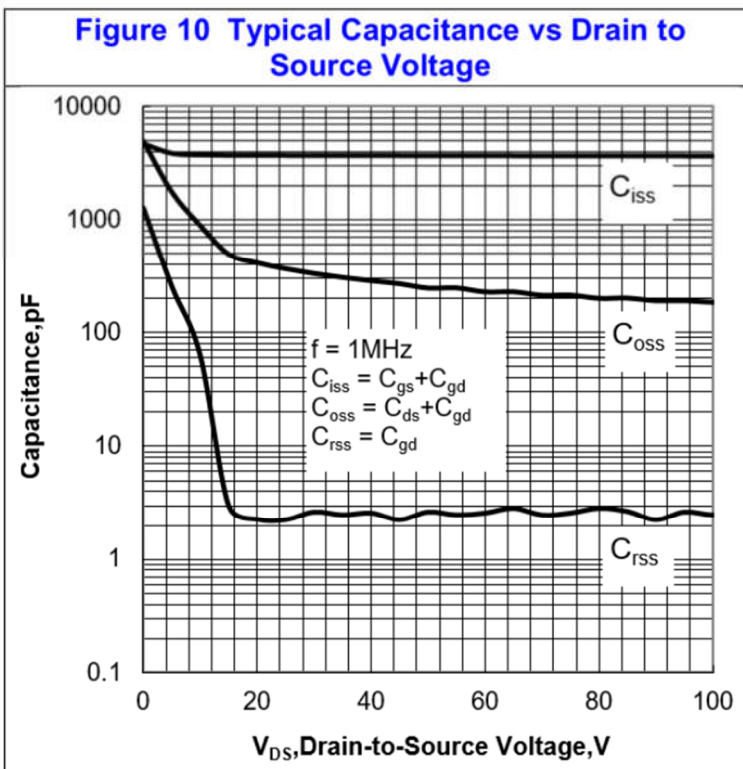
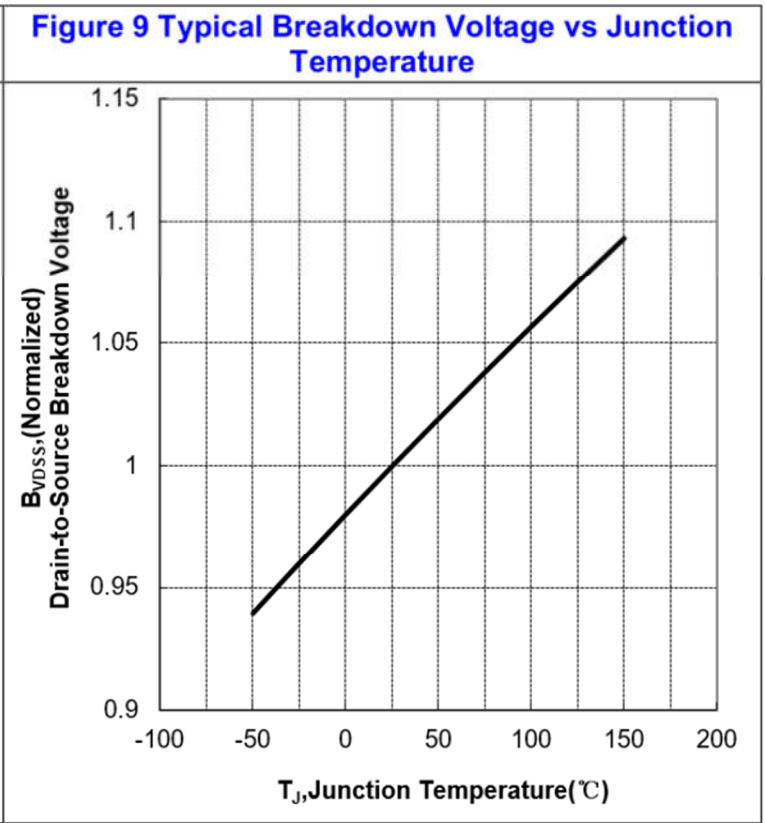
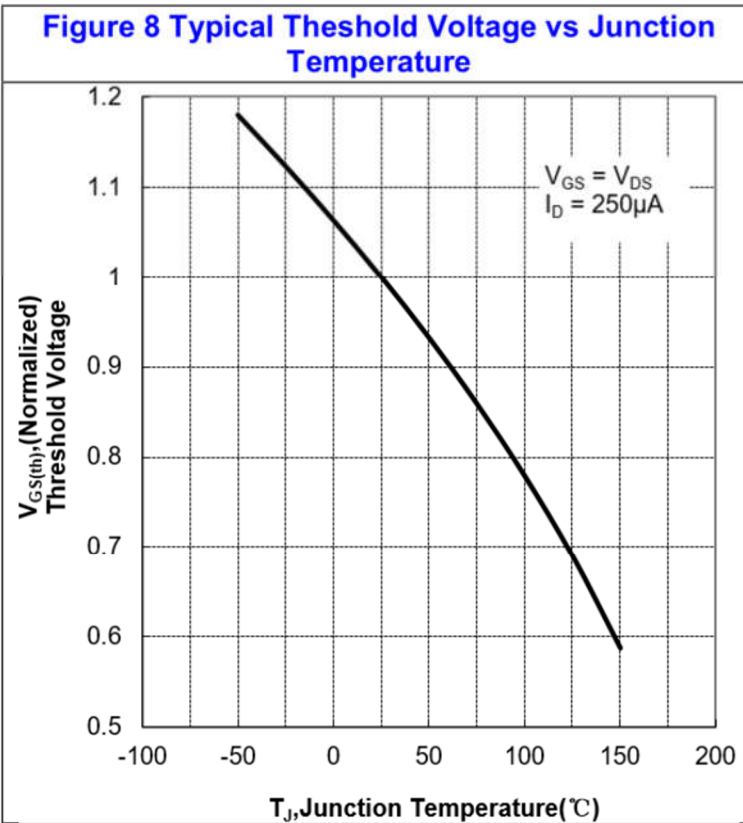
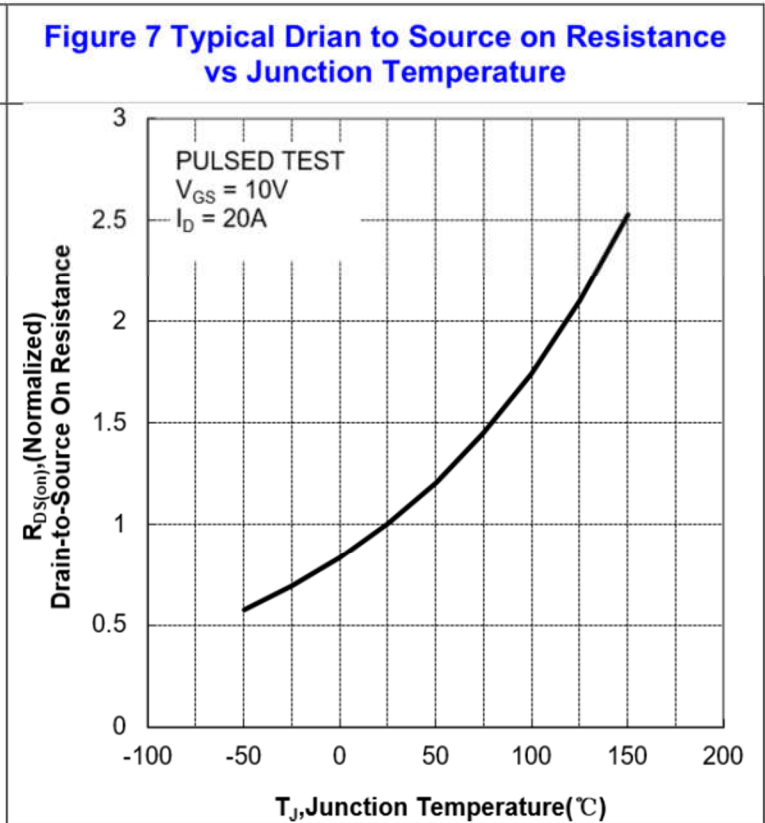
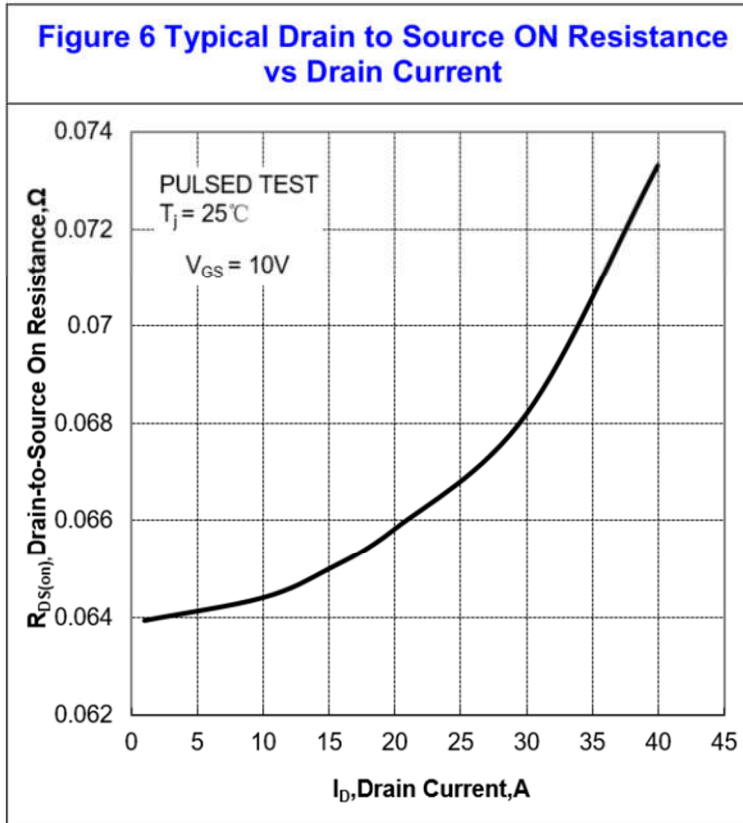
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: L=10mH, IAS=20A, VDD=50V, RG=25 Ω ,Start TJ=25℃;
- 3: ISD ≤40A,di/dt ≤300A/μs,VDD≤BV_{DSS}, Starting TJ=25℃
- 4: Pulse Test: Pulse Width ≤300μs,Duty Cycle≤2%
- 5: Essentially independent of operating temperature

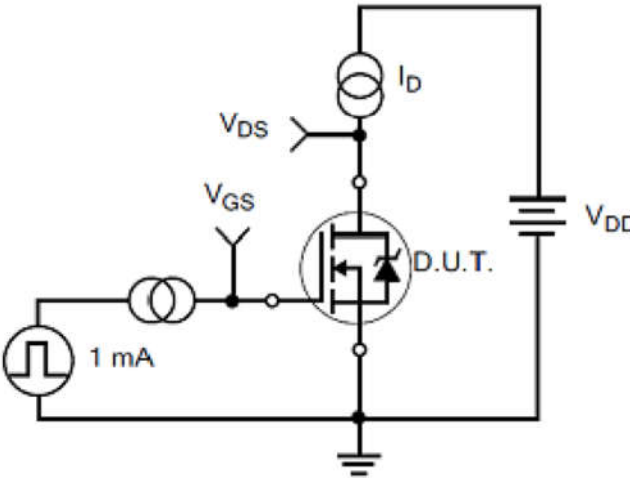
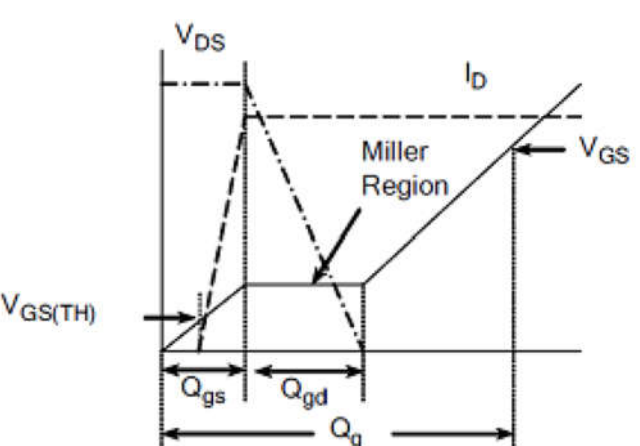
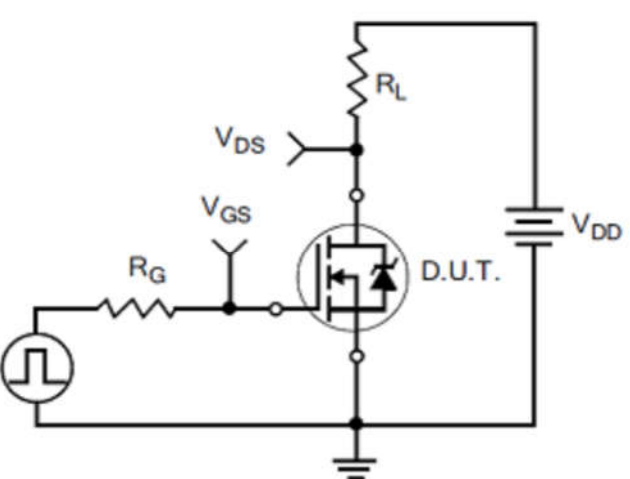
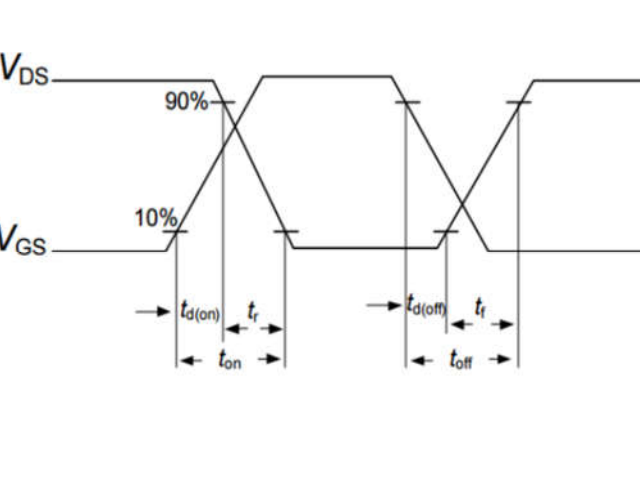
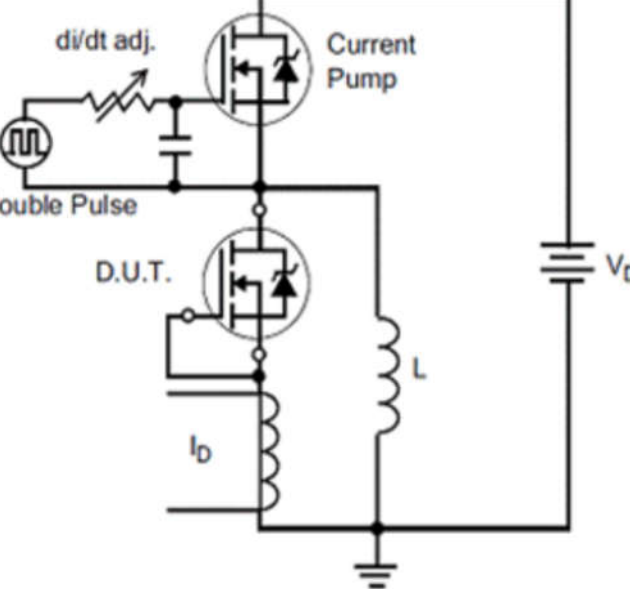
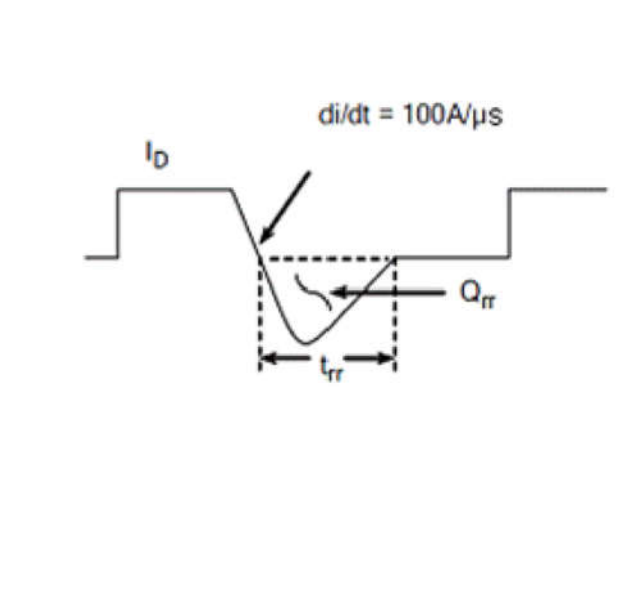
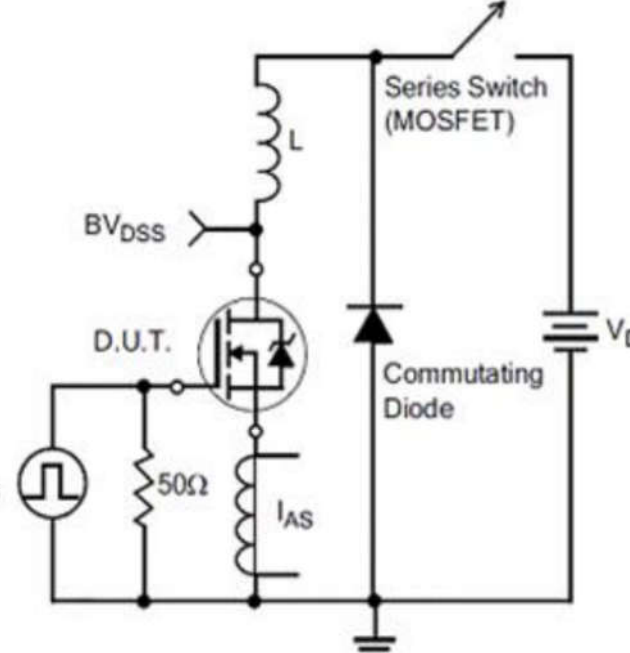
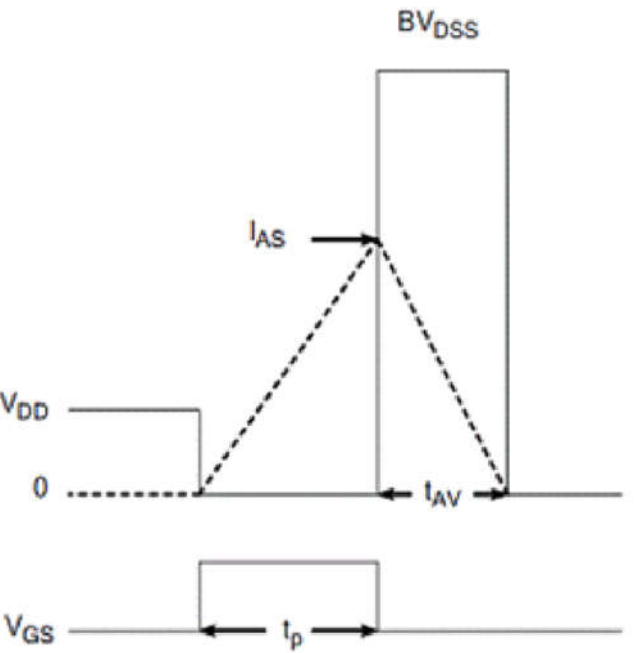
Typical Characteristics

典型特性曲线

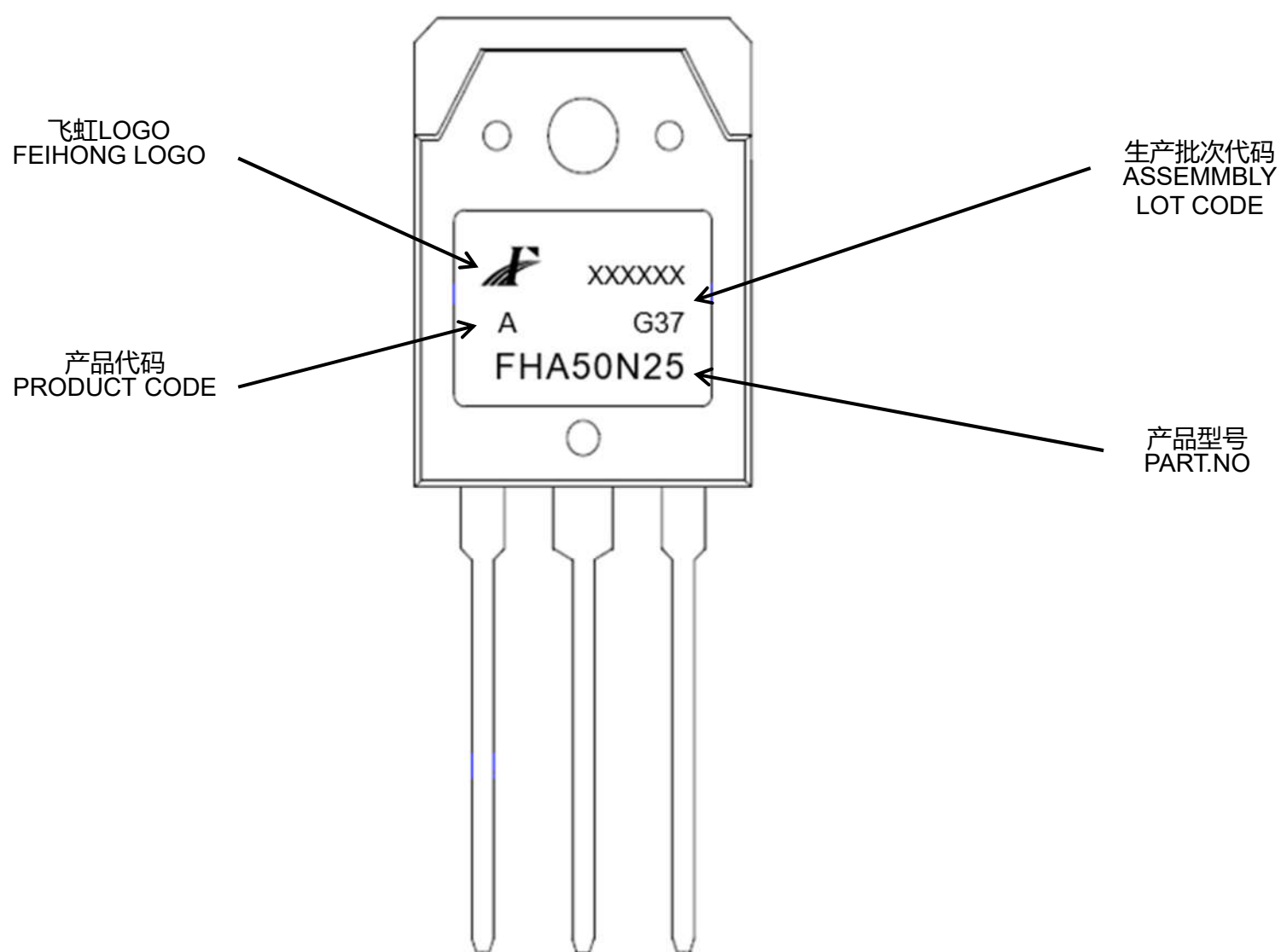




Test Circuit & Waveform

Gate Charge Test Circuit  The diagram shows a MOSFET (D.U.T.) with its gate connected to a 1 mA current source and its drain connected to a load resistor and a drain current source I_D. The gate voltage is V_{GS} and the drain voltage is V_{DS}. The supply voltage is V_{DD}.	Gate Charge Waveforms  The diagram shows the relationship between V_{DS}, I_D, and V_{GS} during switching. It identifies the Miller Region, the threshold voltage $V_{GS(TH)}$, and the gate charges Q_{gs}, Q_{gd}, and Q_g.
Resistive Switching Test Circuit  The diagram shows a MOSFET (D.U.T.) with its gate connected to a current source and its drain connected to a load resistor R_L. The gate voltage is V_{GS} and the drain voltage is V_{DS}. The supply voltage is V_{DD}.	Resistive Switching Waveforms  The diagram shows the switching waveforms for V_{DS} and V_{GS}. It defines the turn-on time $t_{d(on)}$, rise time t_r, turn-off time $t_{d(off)}$, and fall time t_f. The voltage levels are marked at 90% and 10%.
Diode Reverse Recovery Test Circuit  The diagram shows a MOSFET (D.U.T.) with its gate connected to a current source and its drain connected to a diode and an inductor L. The gate voltage is V_{GS} and the drain voltage is V_{DS}. The supply voltage is V_{DD}. A double pulse generator is used to adjust di/dt.	Diode Reverse Recovery Waveform  The diagram shows the reverse recovery current I_D and the reverse recovery charge Q_{rr} during the reverse recovery time t_{rr}. The rate of change of current is specified as $di/dt = 100A/\mu s$.
Unclamped Inductive Switching Test Circuit  The diagram shows a MOSFET (D.U.T.) with its gate connected to a current source and its drain connected to an inductor L and a series switch (MOSFET). The gate voltage is V_{GS} and the drain voltage is V_{DS}. The supply voltage is V_{DD}. A commutating diode is used to clamp the inductor voltage.	Unclamped Inductive Switching Waveform  The diagram shows the switching waveforms for V_{DS} and V_{GS}. It defines the avalanche voltage BV_{DSS}, the avalanche current I_{AS}, and the pulse width t_p.

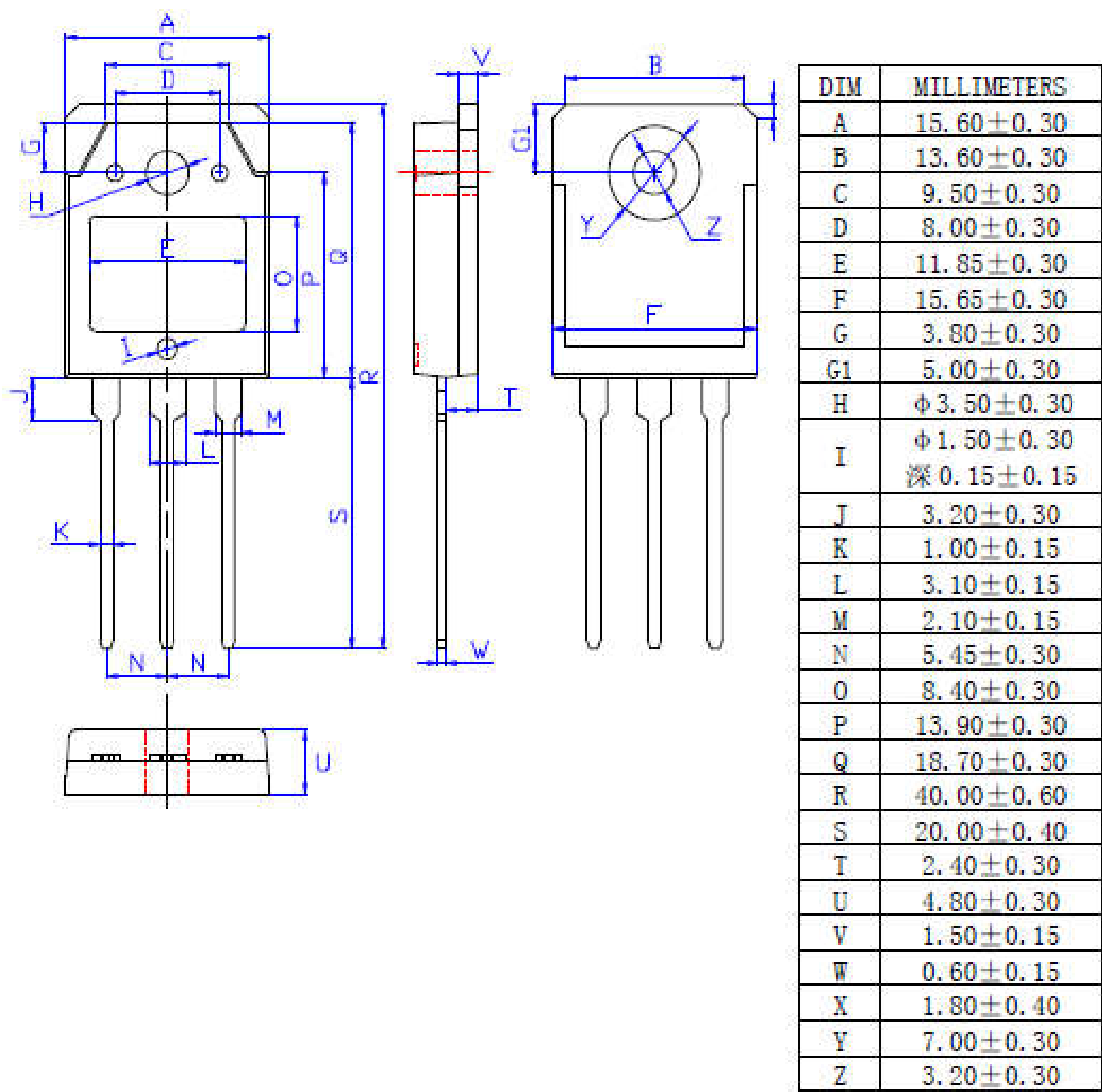
印记 Marking:



外形尺寸:

Package Dimension:

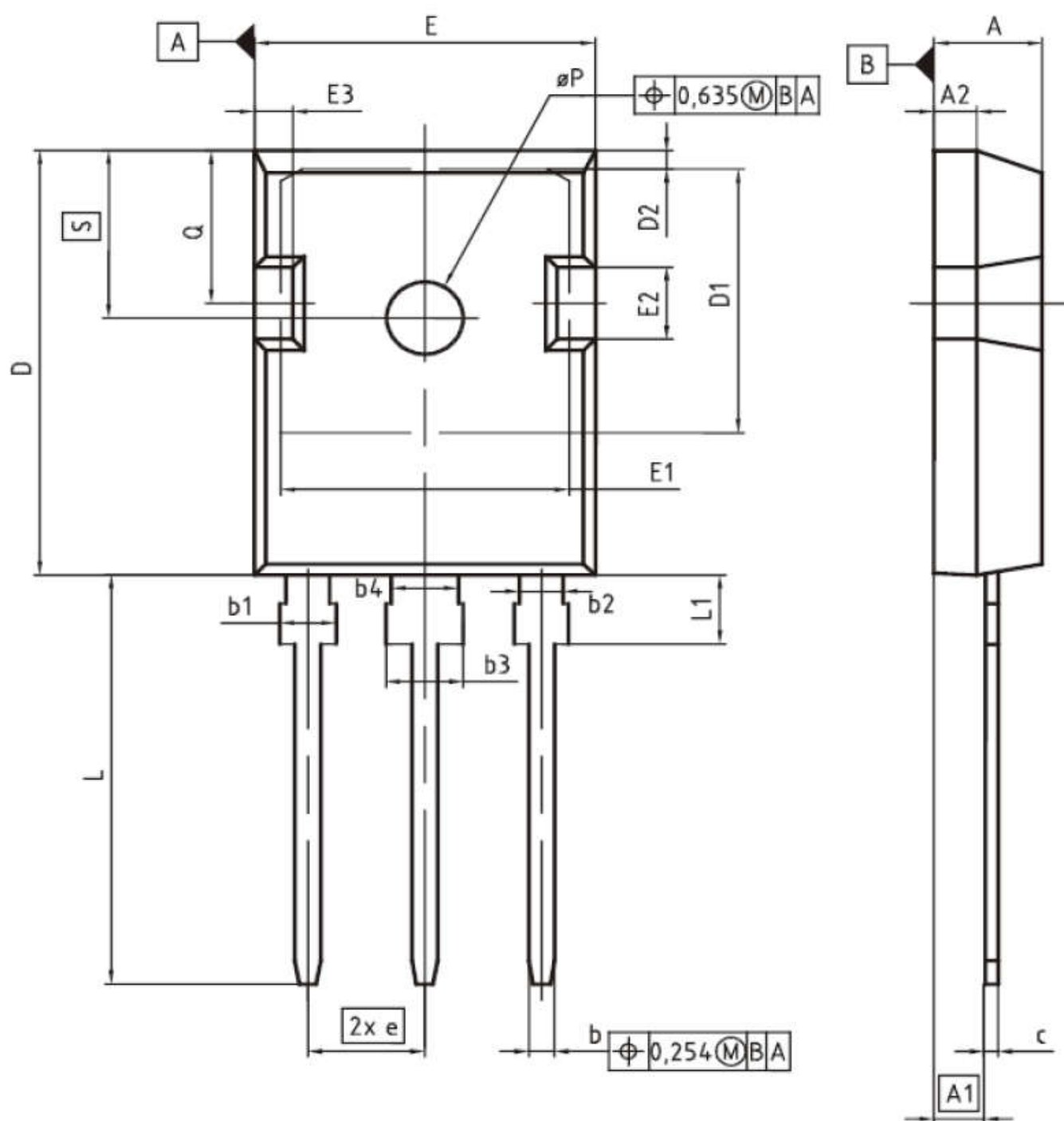
TO-3PN



(Unit: mm)

外形尺寸:
Package Dimension:

TO-247



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44 (BSC)		0.214 (BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
øP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248