650V N-Channel Power MOSFET
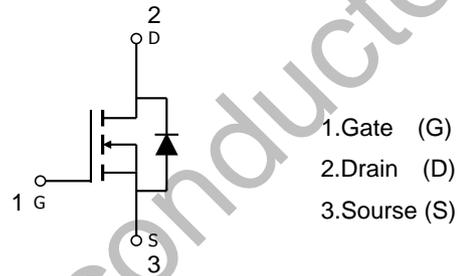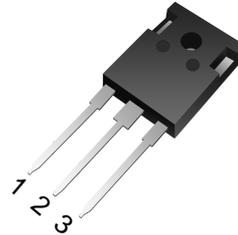
WG WildGoose

TO-247

RoHS COMPLIANT

WGA80N65W

Features:

- ☐ Low on-resistance
- ☐ Fast switching speed
- ☐ Parallel use is easy
- ☐ Unrivalled Gate Charge: Qg= (typ:260nC)
- ☐ VDSS=650 V, I_D=80A
- ☐ R_{DS}(on) : 42mΩ (Max) @V_G=10V
- ☐ 100% Avalanche Tested

2 D

1 G

S 3

1.Gate (G)
2.Drain (D)
3.Sourse (S)

Absolute maximum ratings (T_a = 25°C ,unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	650	V
Continuous drain current (T_c = 25°C)		I_D [*1]	±80	A
Pulsed drain current		I_{DP} [*2]	±228	A
Gate - Source voltage	static	V_{GSS}	±20	V
	AC(f＞1Hz)		±30	V
Avalanche current, single pulse		I_{AS}	13.4	A
Avalanche energy, single pulse		E_{AS} [*3]	1954	mJ
Power dissipation (T_c = 25°C)		P_D	520	W
Junction temperature		T_j	150	°C
Operating junction and storage temperature range		T_{stg}	-55 to +150	°C

Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC} [*4]	-	-	0.25	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	°C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	°C

Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
				Values		
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	650	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V T_j = 25°C	-	-	100	µA
		T_j = 125°C	-	-	1000	
Gate - Source leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 1mA	3.0	-	5.0	V
Static drain - source on - state resistance	$R_{DS(on)}$ [*5]	V_{GS} = 10V, I_D=40A T_j = 25°C	-	0.038	0.042	Ω
		T_j = 125°C	-	0.085	-	
Gate resistance	R_G	f = 1MHz, open drain	-	0.7	-	Ω

Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
				Values		
Input capacitance	C_{iss}	V_{GS} = 0V	-	6500	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	4700	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	520	-	
Turn - on delay time	$t_{d(on)}$ [*5]	V_{DD} ≃ 325V, V_{GS} = 10V	-	65	-	ns
Rise time	t_r [*5]	I_D =40A	-	170	-	
Turn - off delay time	$t_{d(off)}$ [*5]	R_L ≃ 7.87Ω	-	450	-	
Fall time	t_f [*5]	R_G = 10Ω	-	170	-	

Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
				Values		
Total gate charge	Q_g [*5]	V_{DD} ≃ 325V	-	260	-	nC
Gate - Source charge	Q_{gs} [*5]	I_D = 40A	-	40	-	
Gate - Drain charge	Q_{gd} [*5]	V_{GS} = 10V	-	135	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 325V, I_D = 40A	-	6.0	-	V

Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Source current	I_S [*1]	T_C = 25°C	-	-	80	A
Pulsed source current	I_{SP} [*2]		-	-	240	A
Source-Drain voltage	V_{SD} [*5]	V_{GS} = 0V, I_S =80A	-	-	1.5	V
Reverse recovery time	t_{rr} [*5]	I_S =80A di/dt = 100A/μs	-	990	-	ns
Reverse recovery charge	Q_{rr} [*5]		-	32	-	μC
Peak reverse recovery current	I_{rr} [*5]		-	65	-	A

Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve
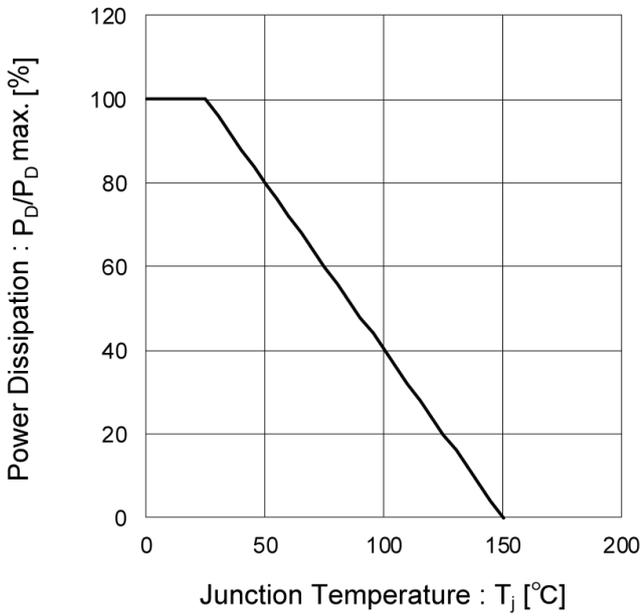
Fig.2 Drain Current Derating Curve
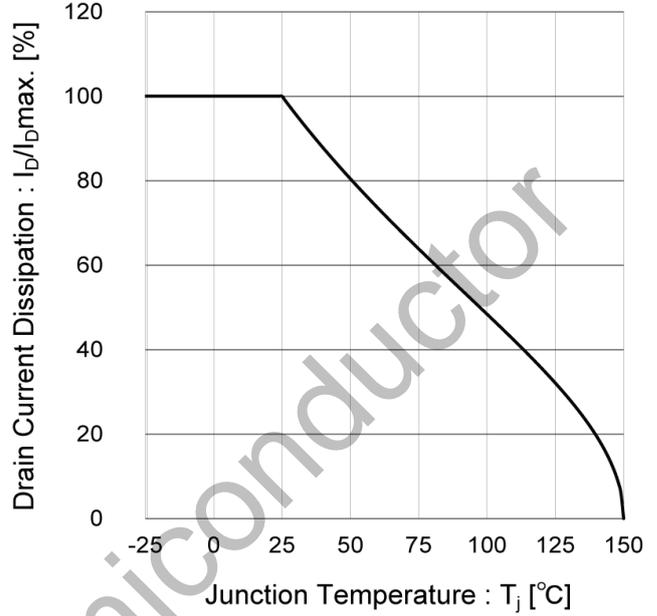
Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width
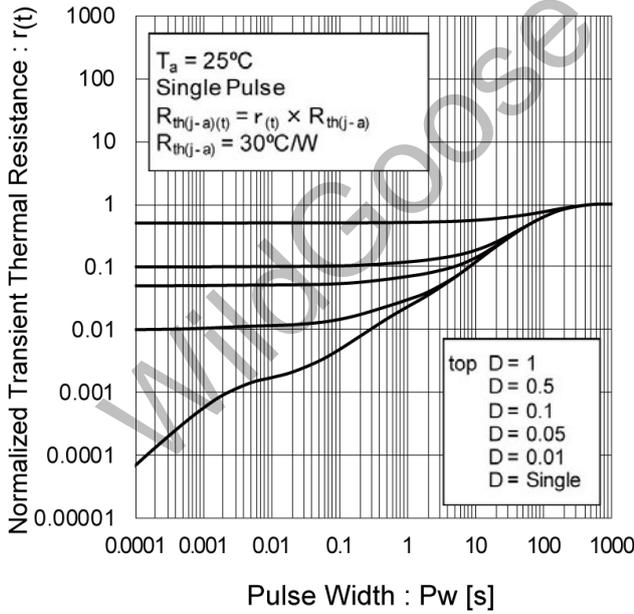
Fig.4 Maximum Safe Operating Area
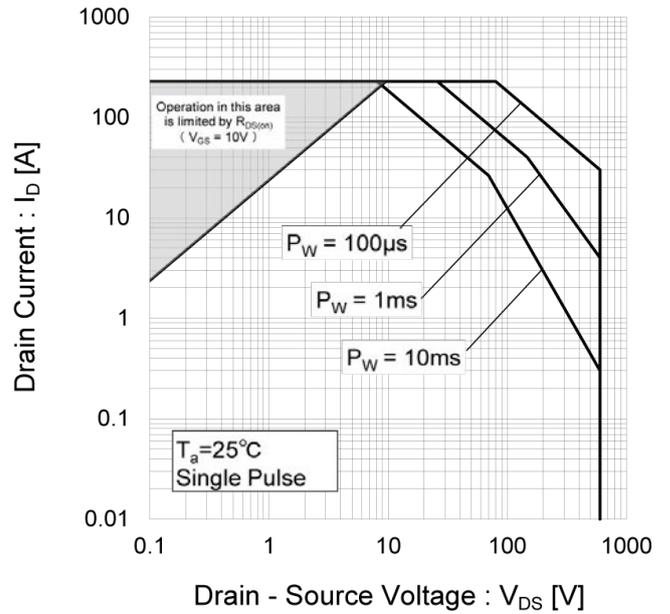
Electrical characteristic curves

Fig.5 Avalanche Energy Derating
Curve vs. Junction Temperature
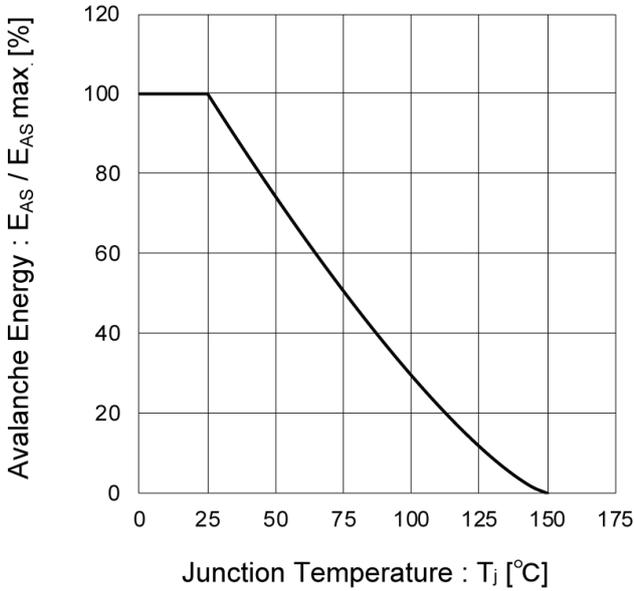
Fig.6 Normalized Breakdown Voltage
vs. Junction Temperature
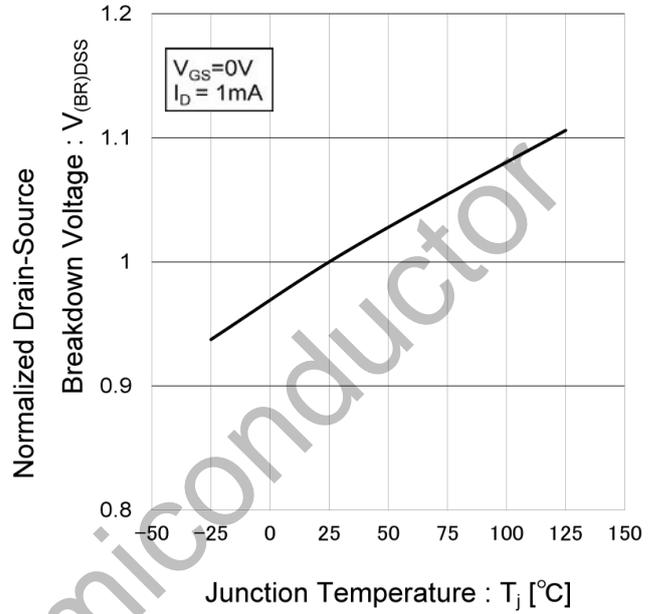
Fig.7 Typical Output Characteristics(I)
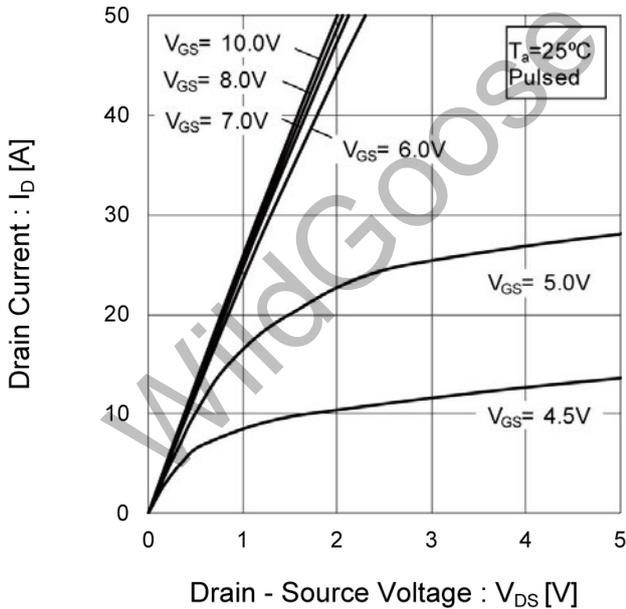
Fig.8 Typical Output Characteristics(II)
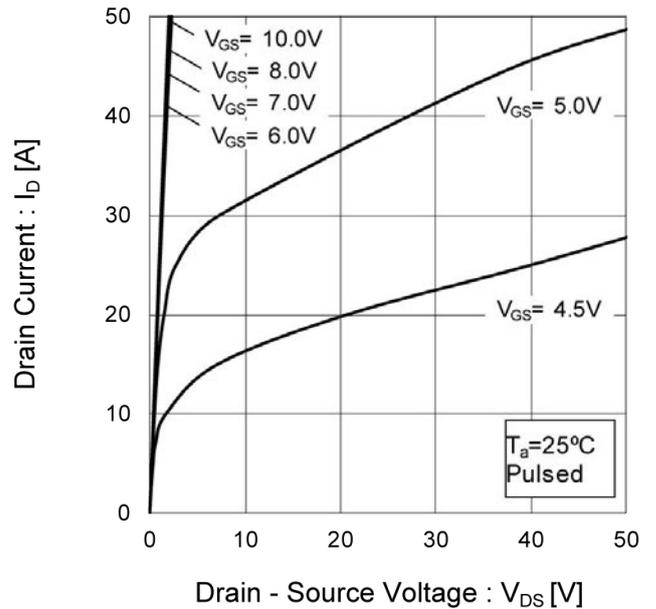
Electrical characteristic curves

Fig.9 Typical Transfer Characteristics
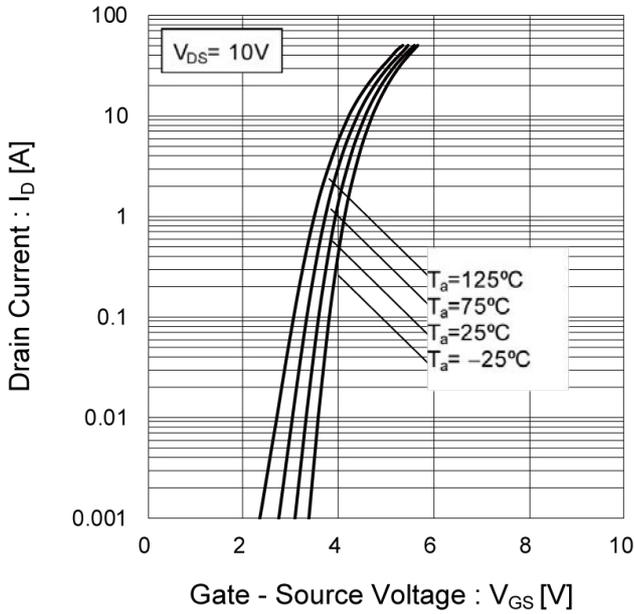
Fig.10 Gate Threshold Voltage
vs. Junction Temperature
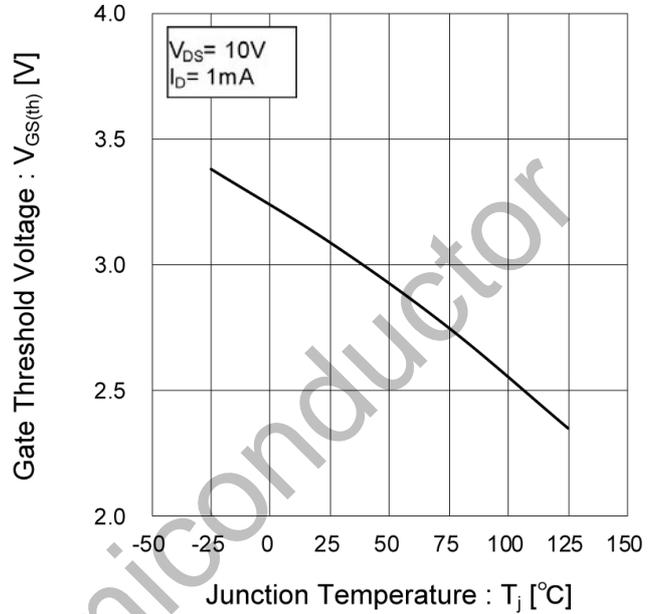
Fig.11 Static Drain - Source On - State
Resistance vs. Drain Current
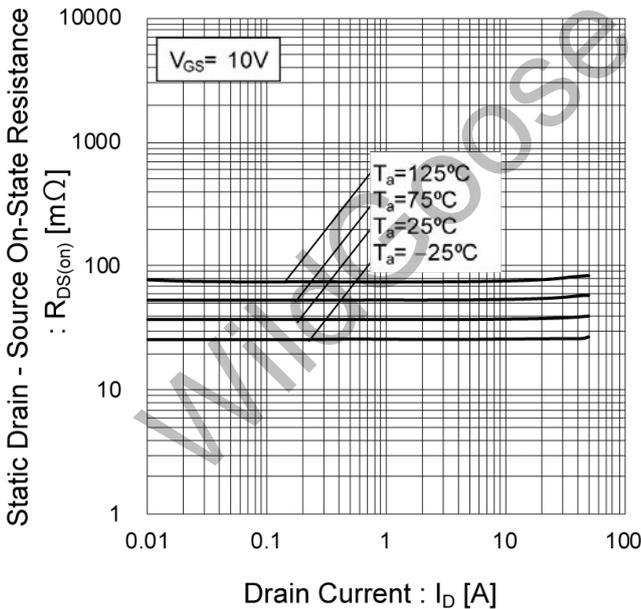
Fig.12 Static Drain - Source On - State
Resistance vs. Gate - Source Voltage
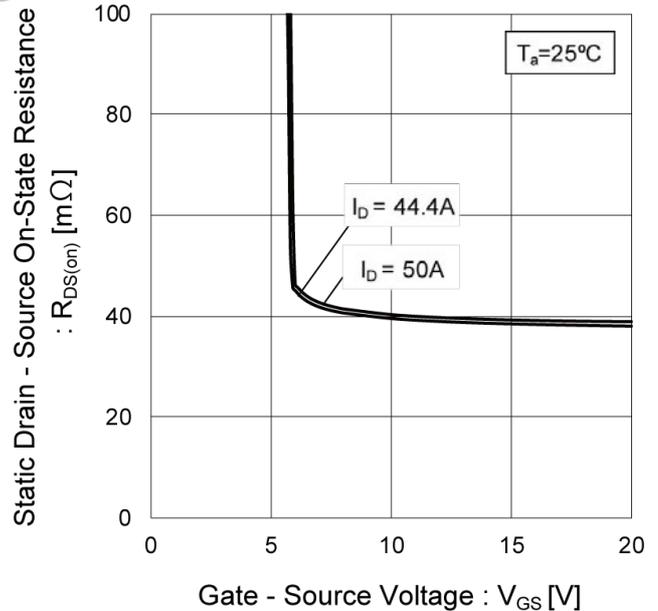
Electrical characteristic curves

Fig.13 Static Drain - Source On - State
Resistance vs. Junction Temperature
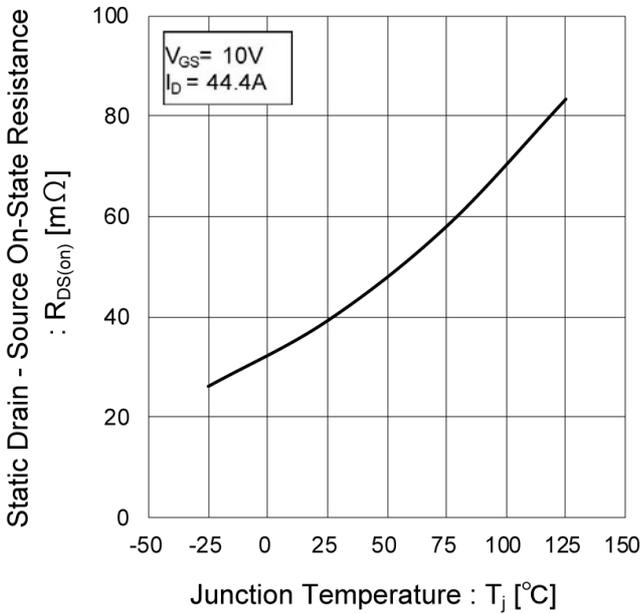
Fig.14 Typical Capacitance
vs. Drain - Source Voltage
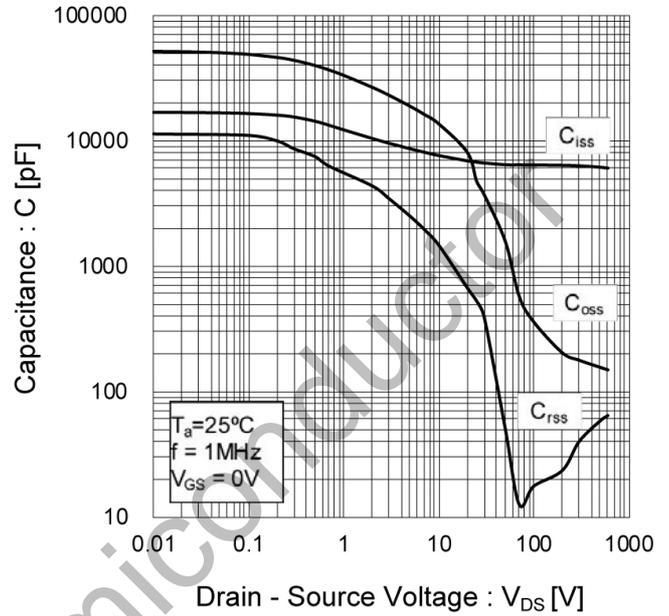
Fig.15 Switching Characteristics
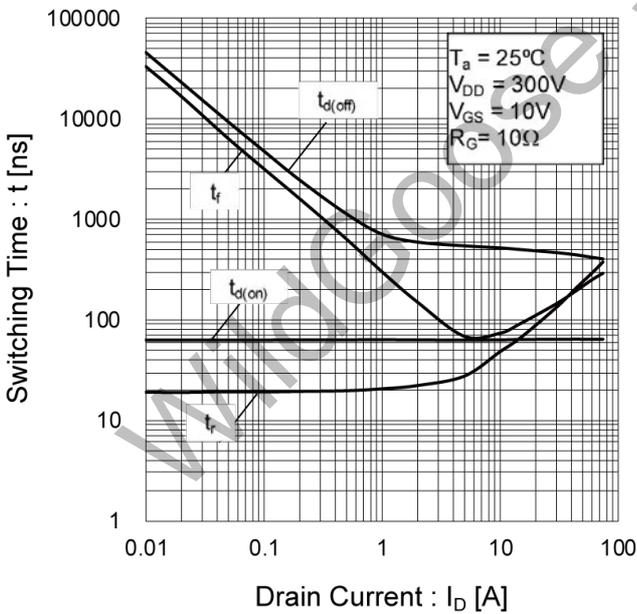
Fig.16 Typical Gate Charge
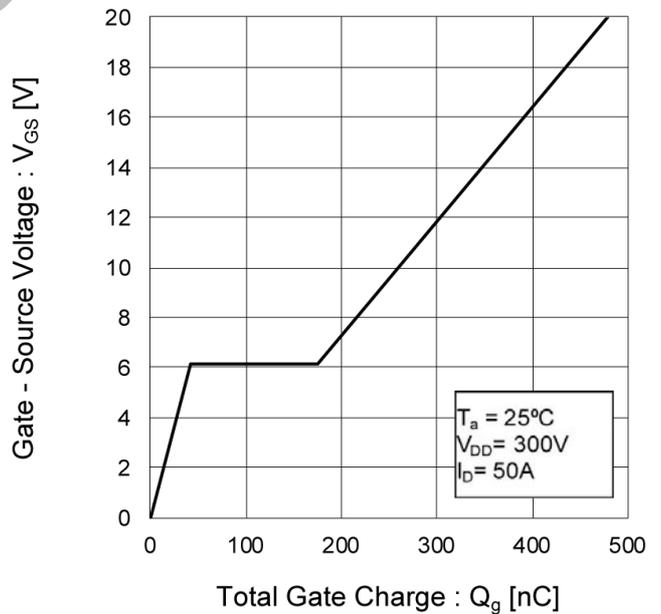
Electrical characteristic curves

Fig.17 Source Current
vs. Source - Drain Voltage
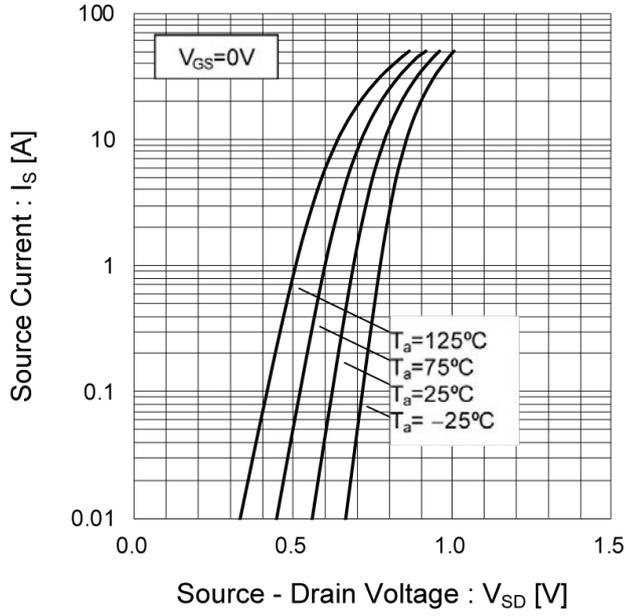
Fig.18 Reverse Recovery Time
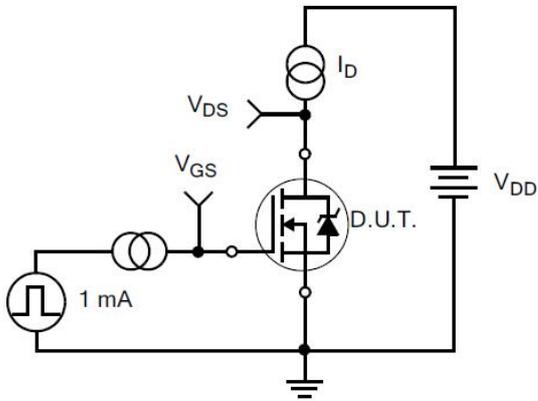vs. Source Current
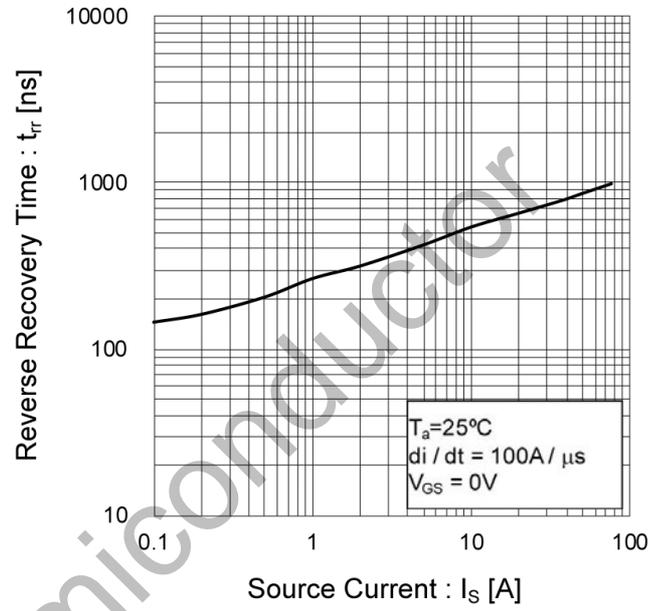
Test Circuit and Waveform

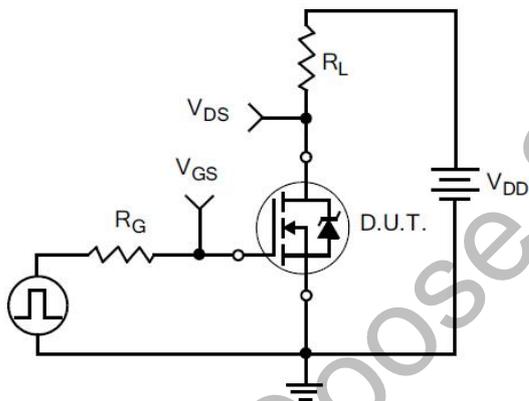Figure 14. Gate Charge Test Circuit
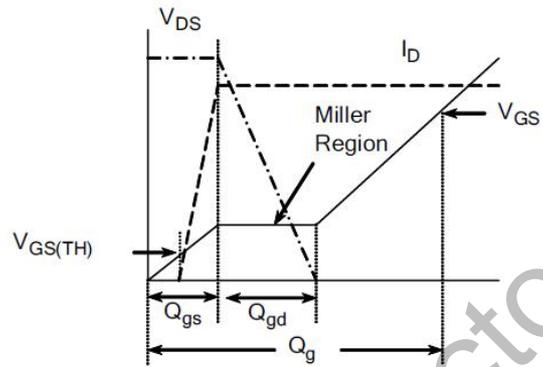
Figure 15. Gate Charge Waveforms
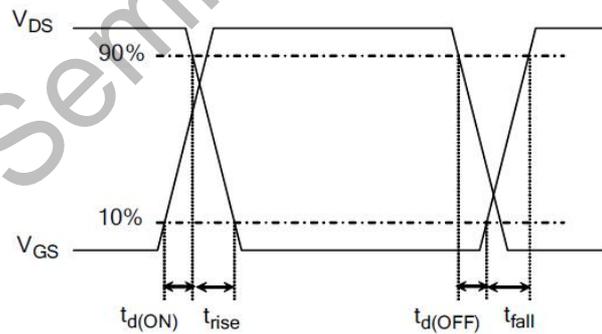

Figure 16. Resistive Switching Test Circuit

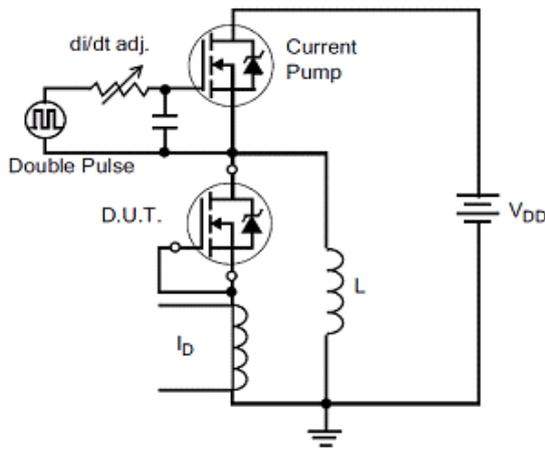Figure 17. Resistive Switching Waveforms

Test Circuit and Waveform
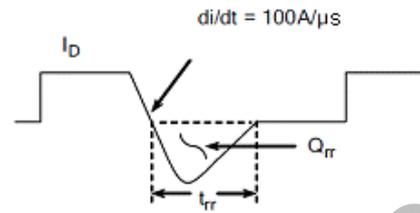

Figure 18. Diode Reverse Recovery Test Circuit
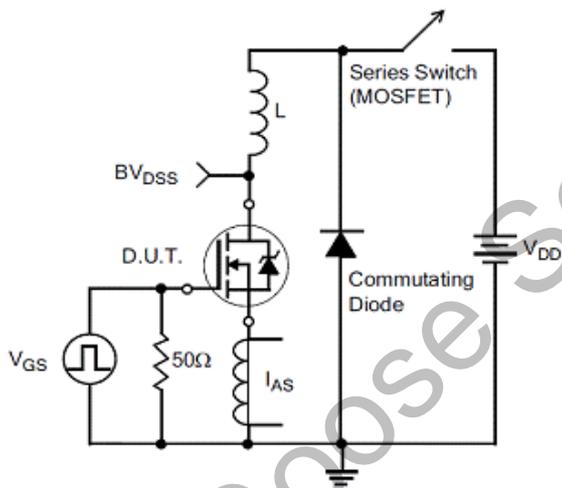

Figure 19. Diode Reverse Recovery Waveform
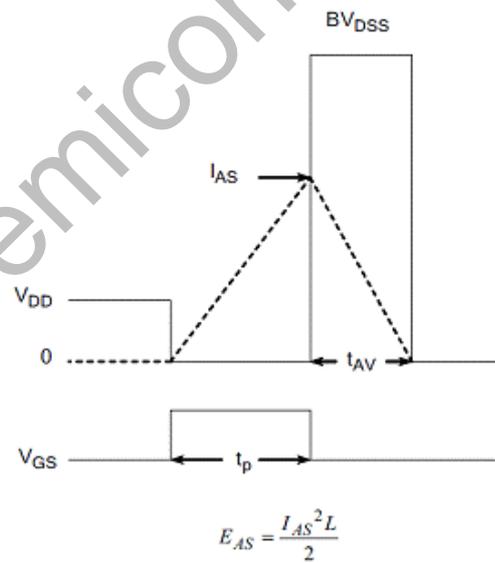

Figure20.Unclamped Inductive Switching Test Circuit

$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure21.Unclamped Inductive Switching Waveform

Package Dimension

TO-247

Unit: mm