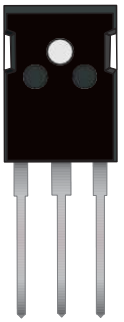
47A 650V N-Channel Super Junction MOSFET

Features:

- RDS(ON)<70mΩ@VGS=10V
- 100% avalanche tested
- RoHS compliant

TO-247



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Mechanical Data：

- Case:TO-247 Package

Application：

- Consumer
- EV Charger
- PFC stages for server & telecom

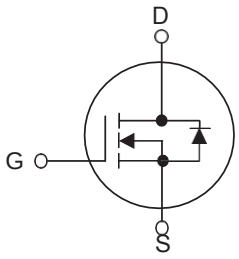
Product Summary

V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
650V	60@ 10V	47	190nc

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



Ordering Information

Part No.	Package Type	Package	Quality(box)
KSJ47N65P	TO-247	Tube	600

Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	660	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	47	A
	T_C=100°C		29	
Pulsed Drain Current (Note 1)		I_{DM}	140	A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	1160	mJ
Avalanche Current(Note 1)		I_{AR}	10	A
Repetitive Avalanche Energy		E_{AR}	1.72	mJ
Power Dissipation T_C=25°C		P_D	391	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +150	C
Maximum Temperature for soldering		T_L	300	C

Table 2.Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0. 32	C/W

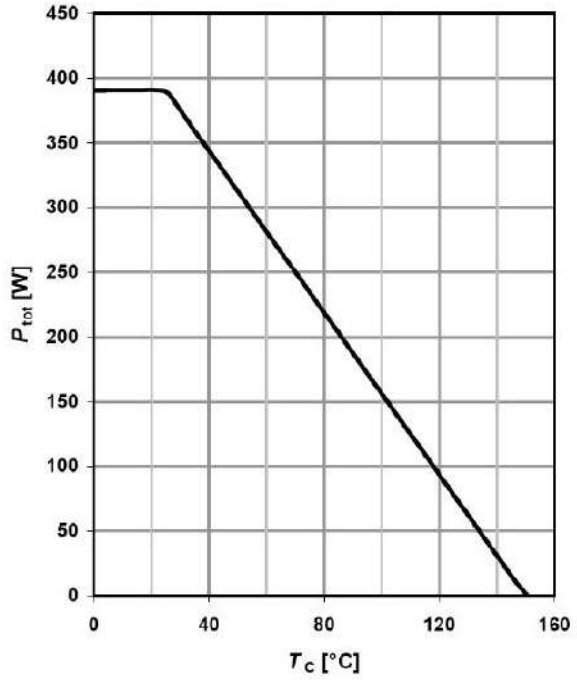
Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	650	--	--	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V,V_{GS}=0V	--	--	1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	--	--	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	--	--	-100	nA
On Characteristics(Note 4)							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250μA	2.5	--	4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=23A	--	60	70	mΩ
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1MHz	--	3100	--	pF
Output Capacitance		C_{OSS}		--	148	--	pF
Reverse Transfer Capacitance		C_{RSS}		--	5	--	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		td (on)	V_{DD}=480V,I_D=23A, R_G=20Ω	--	19	--	ns
Turn-On Rise Time		t_R		--	10	--	ns
Turn-Off Delay Time		td (off)		--	87	--	ns
Turn-Off Fall Time		tf		--	5	--	ns
Total Gate Charge		Q_G	V_{DS}=480V,I_D=23A, V_{GS}=10V	--	190	--	nC
Gate-Source Charge		Q_{GS}		--	30	--	nC
Gate-Drain Charge		Q_{GD}		--	95	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=23A	--	0.9	1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		--	--	47	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=23A dI$_F$/dt=100A/μs (Note 1)	--	710	--	ns
Reverse Recovery Charge		Q_{RR}		--	19	--	nC

Notes：1 Repetitive Rating:Pulse width limited by maximum junction temperature 2
Starting T_J=25°C
4 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
5 Guaranteed by design,not subject to production

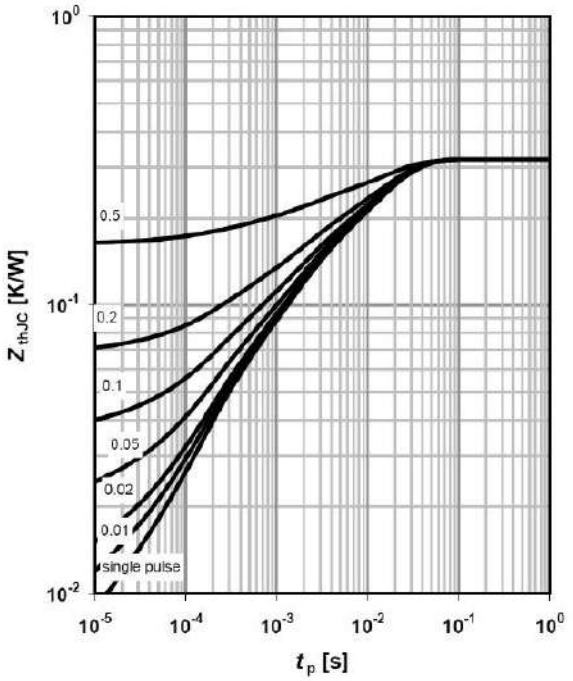
ypical characteristics Diagrams

Power dissipation



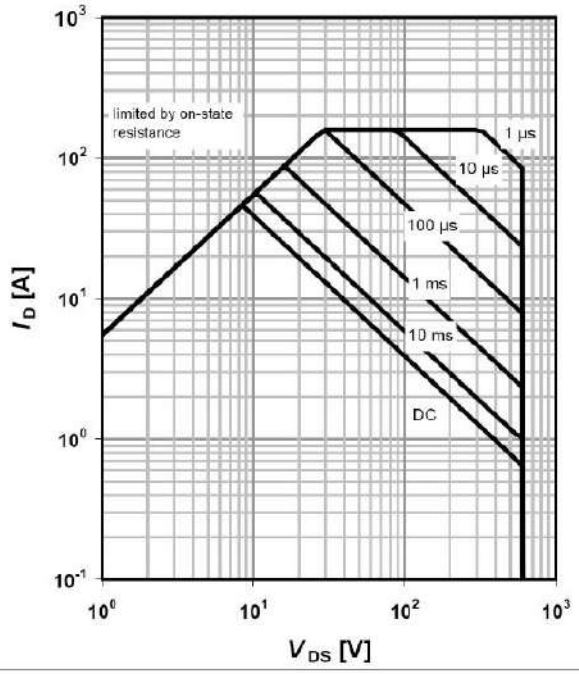
P_{tot} = f(T_C)

Max. transient thermal impedance



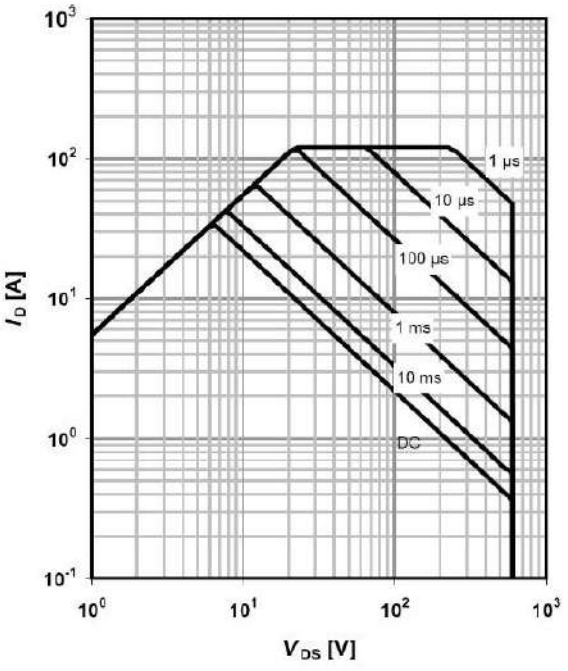
$Z_{(thJC)}$=f(tp); parameter: D=t_p/T

Safe operating area T_C=25 °C



I_D=f(V_{DS}); T_C=25 °C; V_{GS} > 7V; D=0; parameter t_p

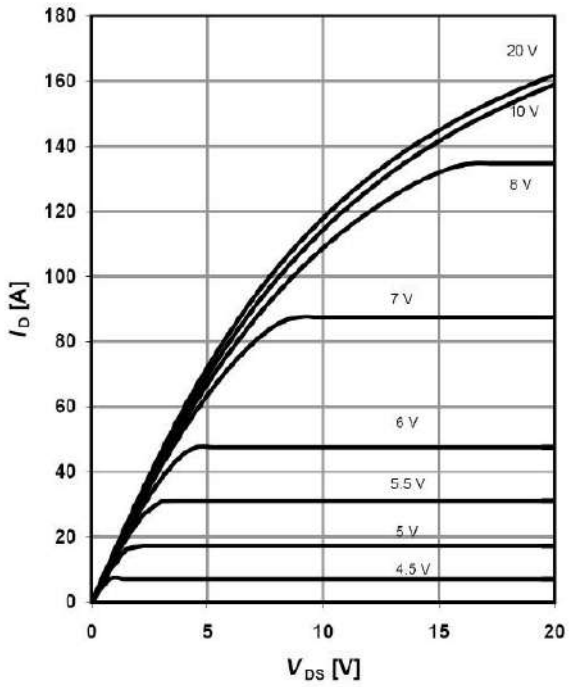
Safe operating area T_C=80 °C



I_D=f(V_{DS}); T_C=80°C; V_{GS} > 7V; D=0; parameter t_p

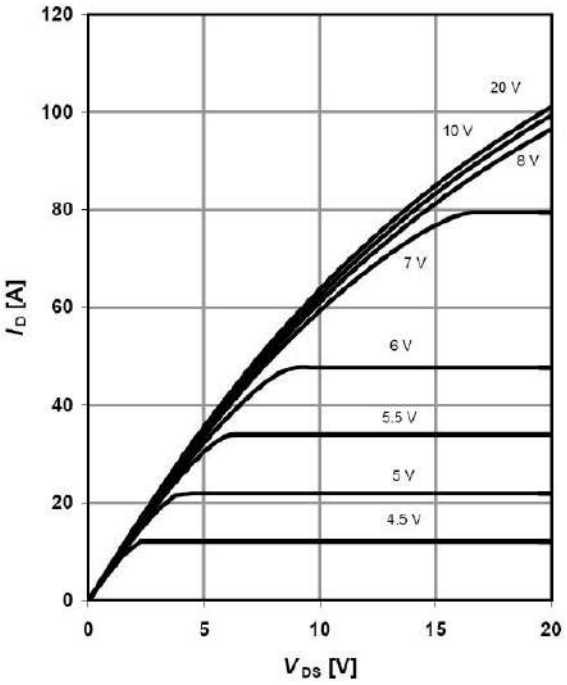
Typical characteristics Diagrams

Typ. output characteristics T_j=25 °C



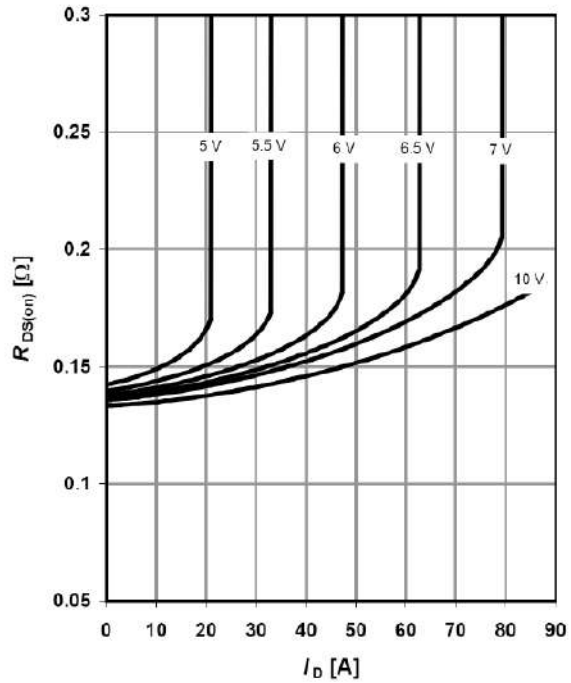
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Typ. output characteristics T_j=125 °C



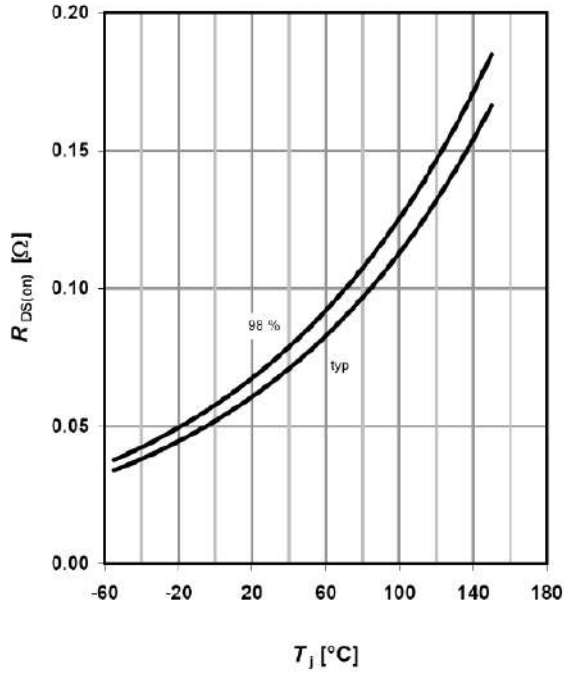
I_D=f(V_{DS}); T_j=125 °C; parameter: V_{GS}

Typ. drain-source on-state resistance



$R_{DS(on)}$=f(I_D); T_j=125 °C; parameter: V_{GS}

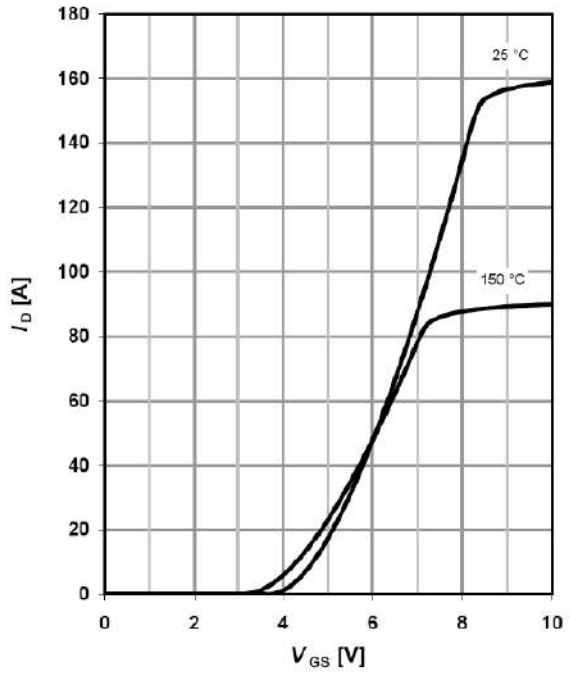
Drain-source on-state resistance



$R_{DS(on)}$=f(T_j); I_D=17.6 A; V_{GS}=10 V

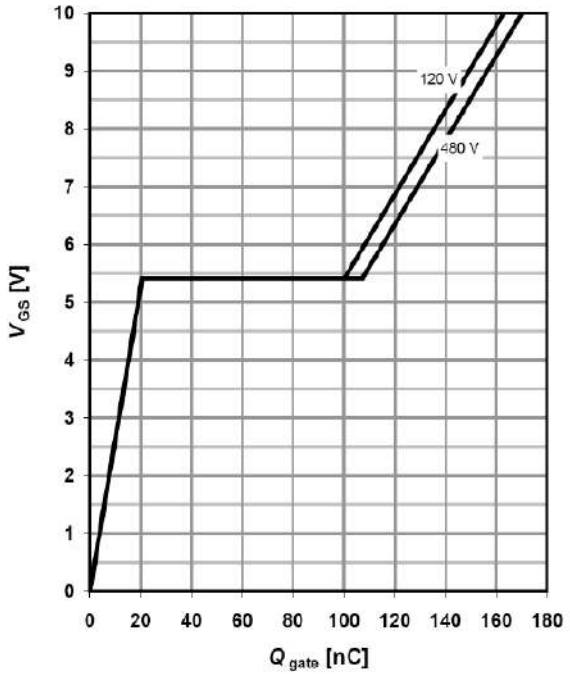
Typical characteristics Diagrams

Typ. transfer characteristics



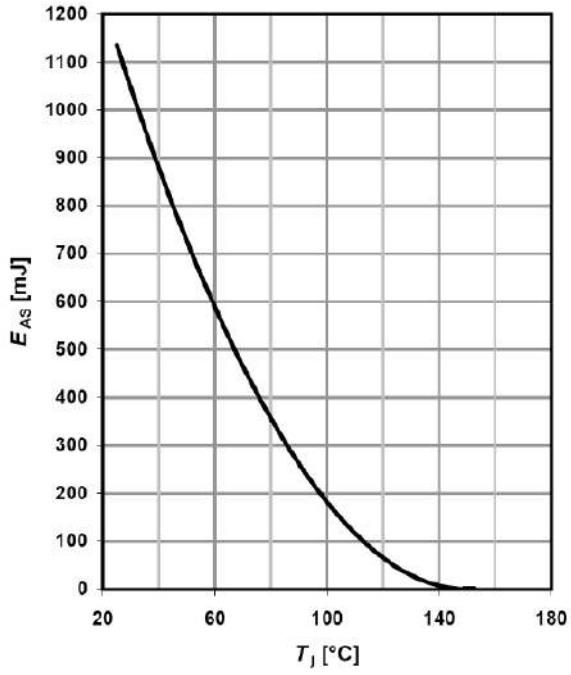
I_D=f(V_{GS}); V_{DS}=20V

Typ. gate charge



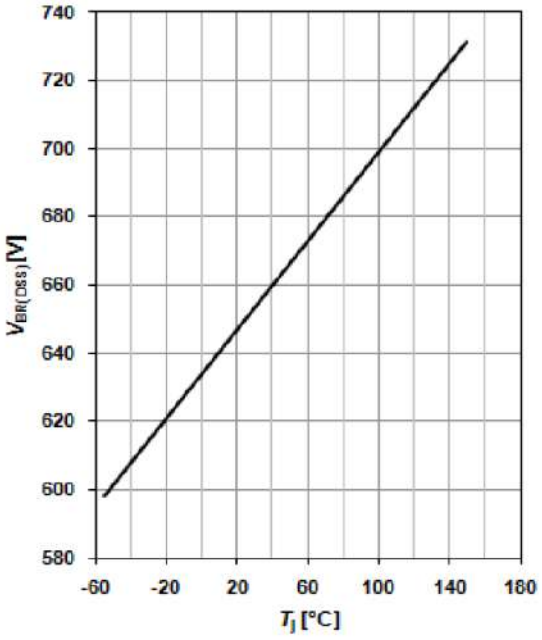
V_{GS}=f(Q_{gate}), I_D=26.3 A pulsed

Avalanche energy



E_{AS}=f(T_j); I_D=9.3 A; V_{DD}=50 V

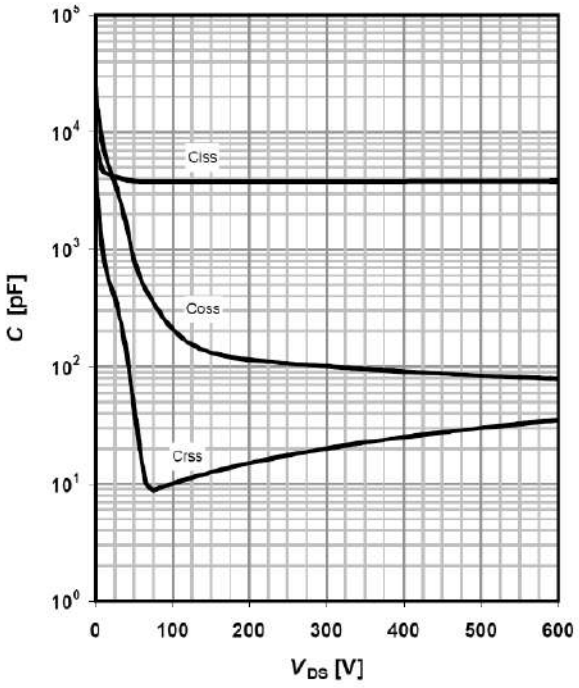
Drain-source breakdown voltage



$V_{BR(DSS)}$=f(T_j); I_D=1.0 mA

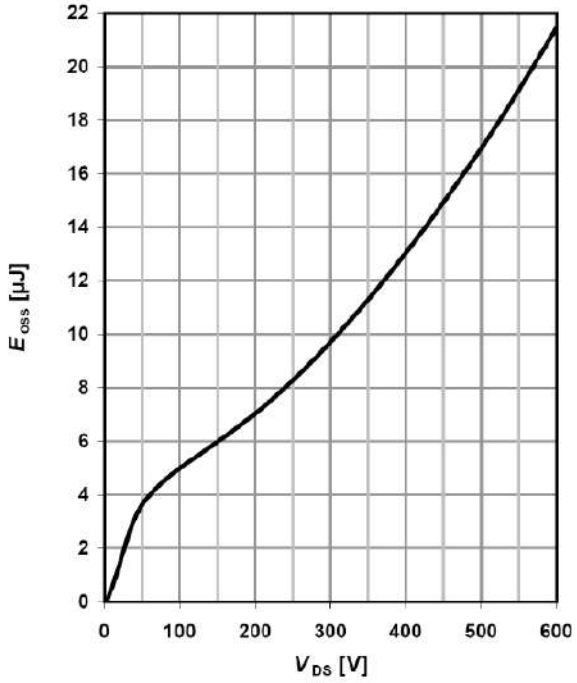
Typical characteristics Diagrams

Typ. capacitances



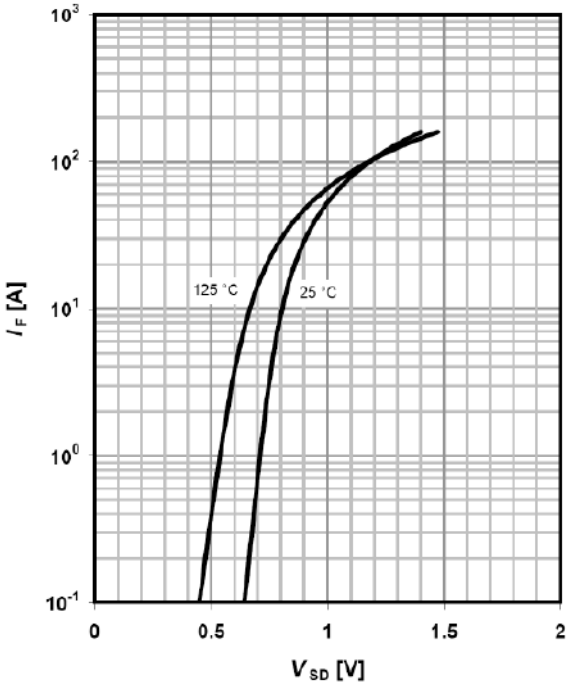
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Typ. C_{oss} stored energy



E_{oss}=f(V_{DS})

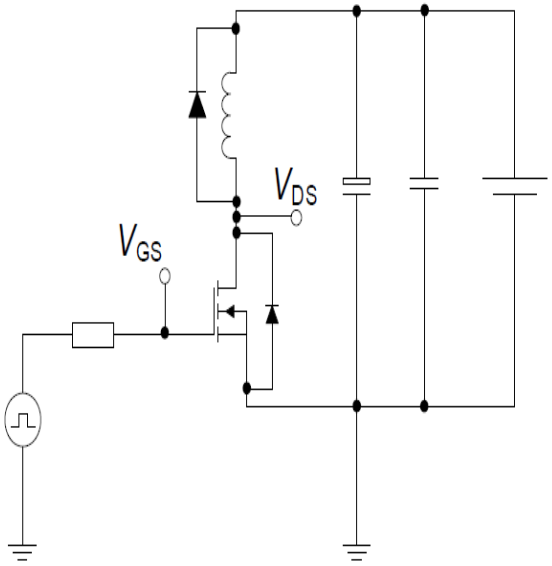
Forward characteristics of reverse diode



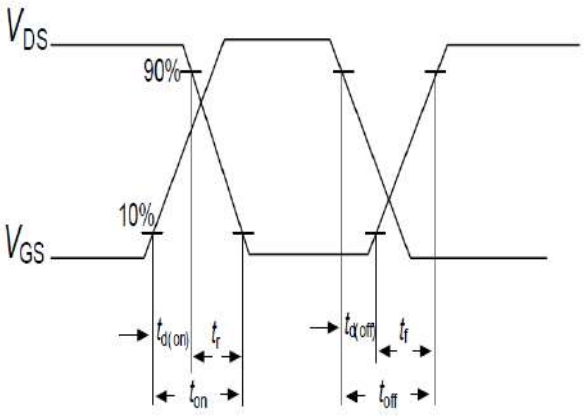
I_F=f(V_{SD}); parameter: T_j

Switching times test circuit and waveform for inductive load

Switching times test circuit for inductive load

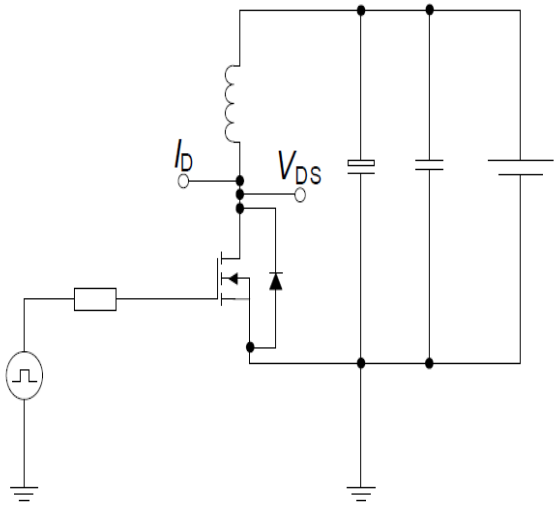


Switching time waveform

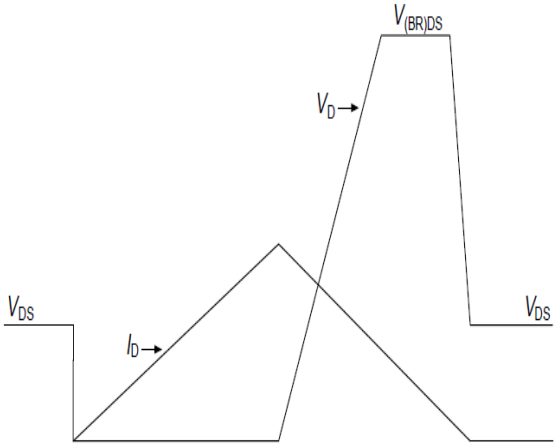


Unclamped inductive load test circuit and waveform

Unclamped inductive load test circuit

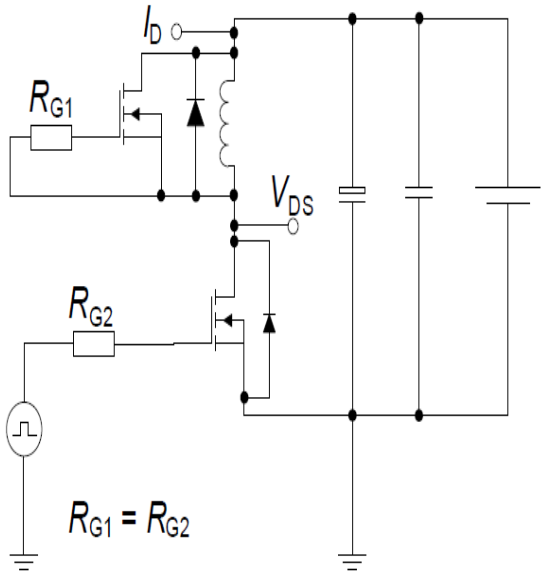


Unclamped inductive waveform

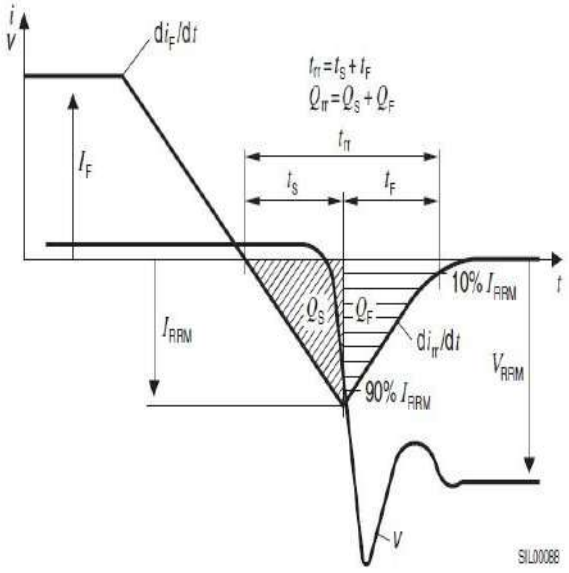


Test circuit and waveform for diode characteristics

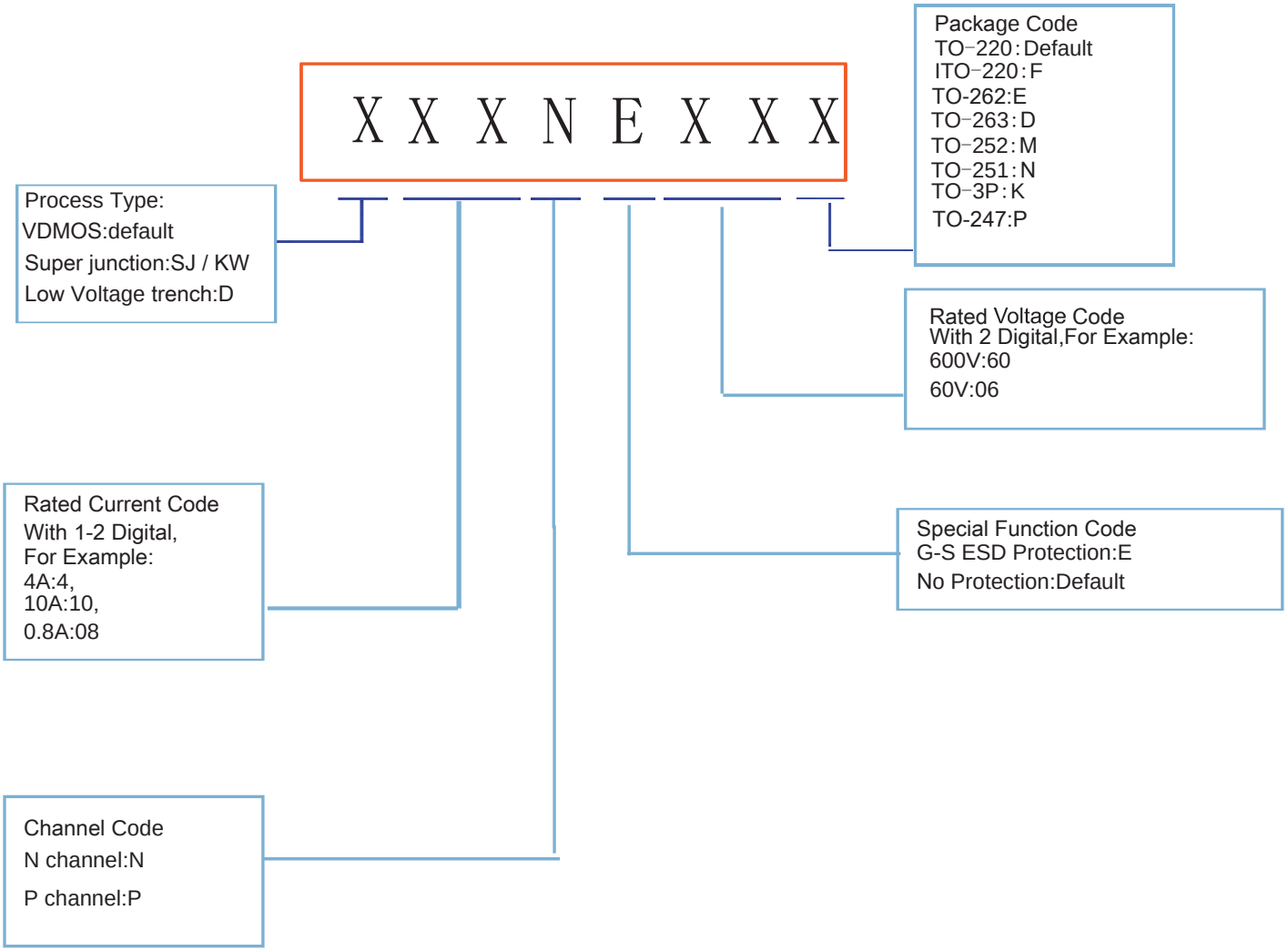
Test circuit for diode characteristics



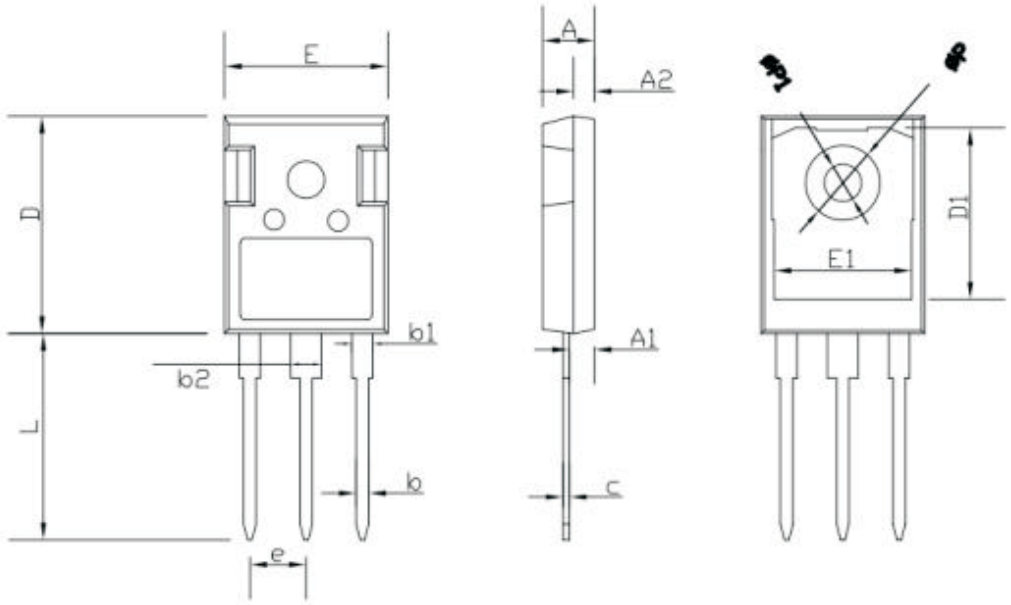
Diode recovery waveform



Product Names Rules



TO-247 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.96	2.06	0.0772	0.0812
b2	2.96	3.06	0.117	0.121
c	0.59	0.66	0.0232	0.0260
D	20.90	21.10	0.8235	0.8313
D1	16.25	16.85	0.6403	0.6639
E	15.70	15.90	0.6186	0.6265
E1	13.10	13.50	0.5161	0.5319
e	5.44		0.2143	
L	19.80	20.10	0.7801	0.7919
ΦP	3.50	3.70	0.1379	0.1458
ΦP1	0	7.30	0	0.2876