

## FEATURES

- $R_{DS(ON)} < 70m\Omega @ V_{GS}=10V$
- 100% avalanche tested
- RoHS compliant

Product Summary			
$V_{DS}$	$R_{DS(on)}$ (m $\Omega$ ) Typ	$I_D$ (A)	$Q_g$ (Typ)
600V	60@10V	47	190nc

## Mechanical Data

- Case:TO-247 Package

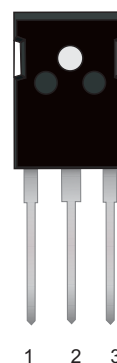
## Application

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

## Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ47N60P	TO-247	Tube	600

TO-247



## Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

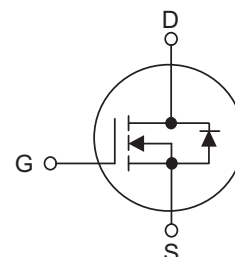


Table1 Absolute Maximum Ratings ( $T_C=25^\circ C$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	600	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	47
		$T_C=100^\circ C$	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 $T_C=25^\circ C$	$P_D$	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 ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V$	--	--	1	$\mu A$
Gate- Source Leakage Current	Forward	$I_{GSS}$	--	--	100	nA
	Reverse				-100	nA
On Characteristics(Note 4)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	--	4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=23A$	--	60	70	m $\Omega$
Dynamic Characteristics(Note 5)						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	--	3100	--	pF
Output Capacitance	$C_{OSS}$		--	148	--	pF
Reverse Transfer Capacitance	$C_{RSS}$		--	5	--	pF
Switching Characteristics (Note 5)						
Turn-On Delay Time	$t_d(\text{on})$	$V_{DD}=480V, I_D=23A,$ $R_G=20\Omega$	--	19	--	ns
Turn-On Rise Time	$t_R$		--	10	--	ns
Turn-Off Delay Time	$t_d(\text{off})$		--	87	--	ns
Turn-Off Fall Time	$t_f$		--	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	$V_{SD}$	$V_{GS}=0V, I_S=23A$	--	--	1.3	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$		--	--	47	A
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_F=23A$	--	710	--	ns
Reverse Recovery Charge	$Q_{RR}$	$di/dt=100A/\mu s$ (Note 1)	--	19	--	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

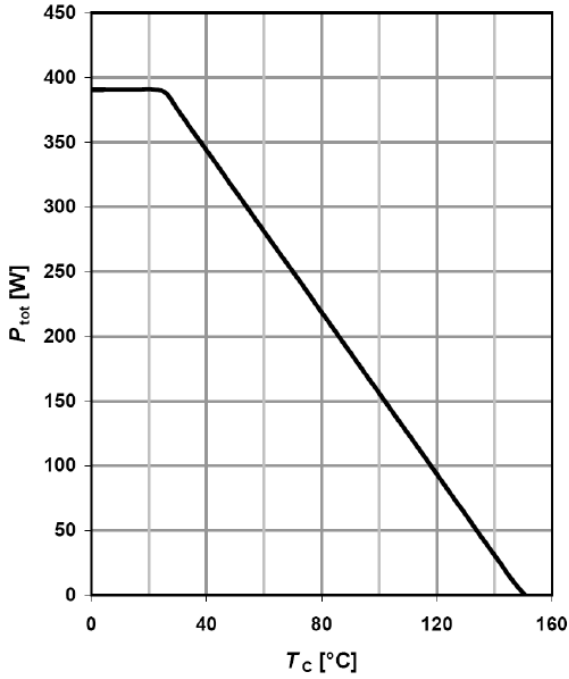
2 Starting  $T_J=25^{\circ}\text{C}$

4 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

5 Guaranteed by design,not subject to production

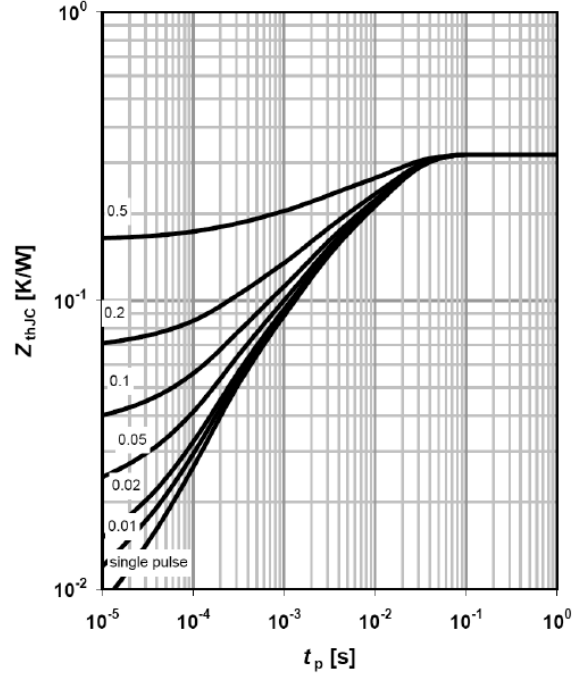
Typical characteristics Diagrams

Power dissipation



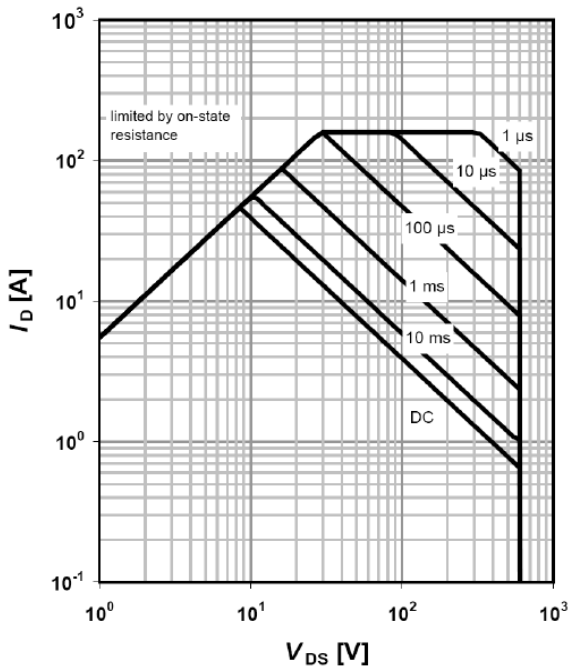
$P_{tot} = f(T_c)$

Max. transient thermal impedance



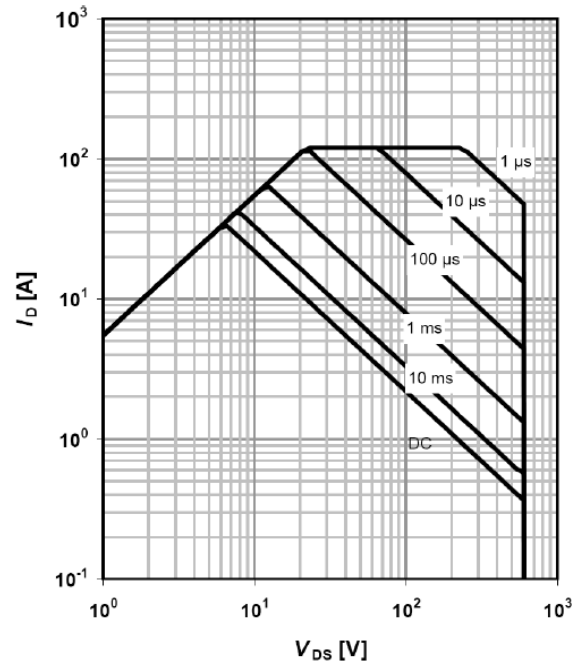
$Z_{(thJC)} = f(t_p)$ ; parameter:  $D = t_p / T$

Safe operating area  $T_c = 25^\circ\text{C}$



$I_D = f(V_{DS})$ ;  $T_c = 25^\circ\text{C}$ ;  $V_{GS} > 7\text{V}$ ;  $D = 0$ ; parameter  $t_p$

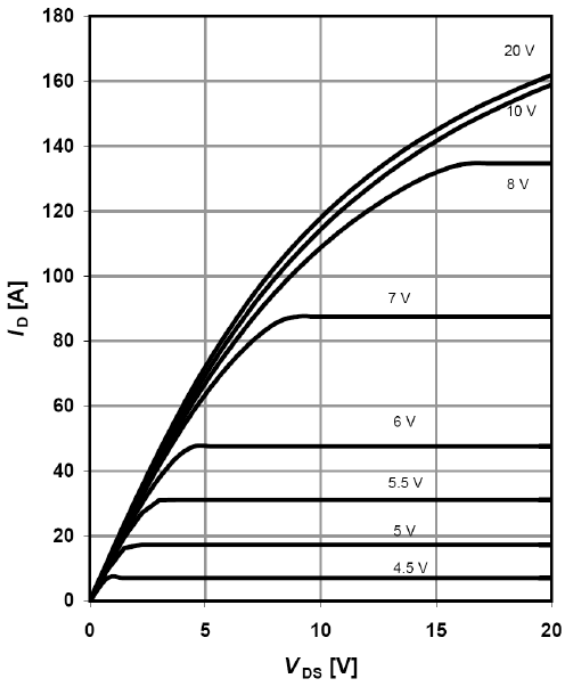
Safe operating area  $T_c = 80^\circ\text{C}$



$I_D = f(V_{DS})$ ;  $T_c = 80^\circ\text{C}$ ;  $V_{GS} > 7\text{V}$ ;  $D = 0$ ; parameter  $t_p$

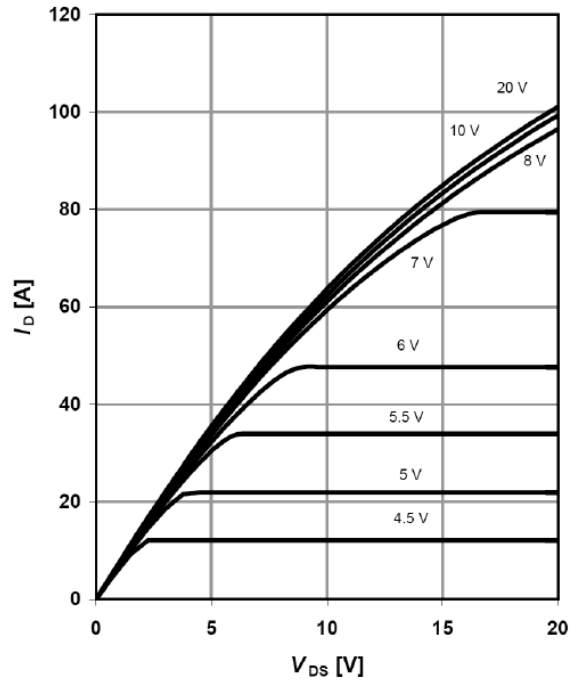
Typical characteristics Diagrams

Typ. output characteristics  $T_j=25\text{ }^\circ\text{C}$



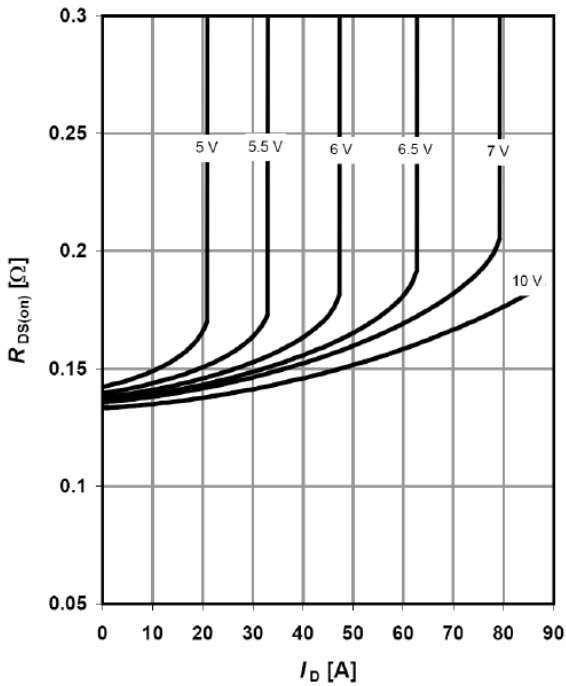
$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C};$  parameter:  $V_{GS}$

Typ. output characteristics  $T_j=125\text{ }^\circ\text{C}$



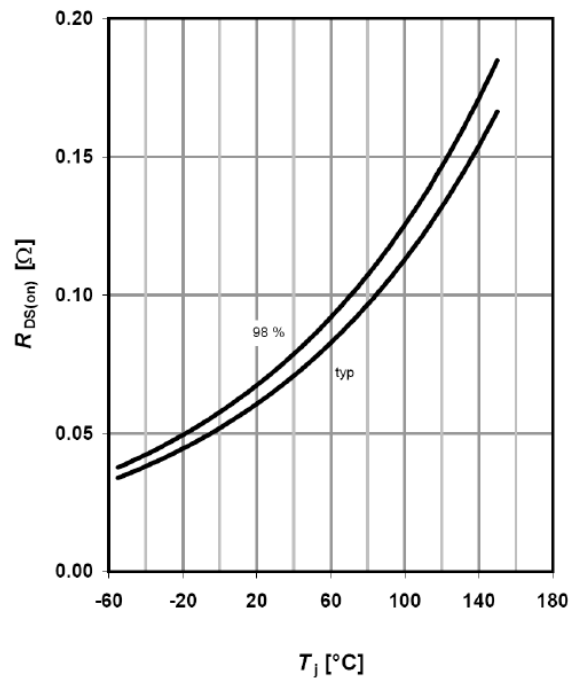
$I_D=f(V_{DS}); T_j=125\text{ }^\circ\text{C};$  parameter:  $V_{GS}$

Typ. drain-source on-state resistance



$R_{DS(on)}=f(I_D); T_j=125\text{ }^\circ\text{C};$  parameter:  $V_{GS}$

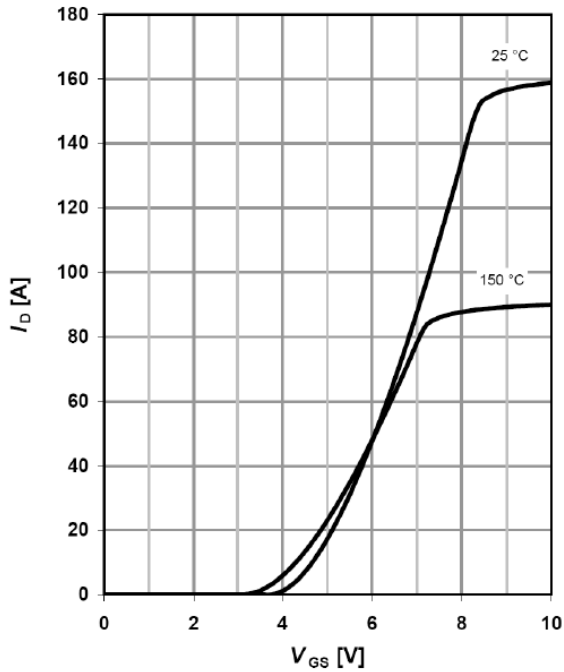
Drain-source on-state resistance



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

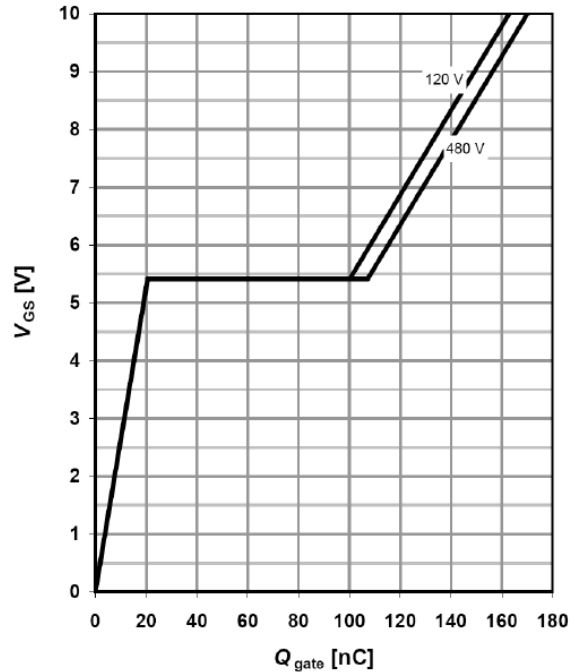
Typical characteristics Diagrams

Typ. transfer characteristics



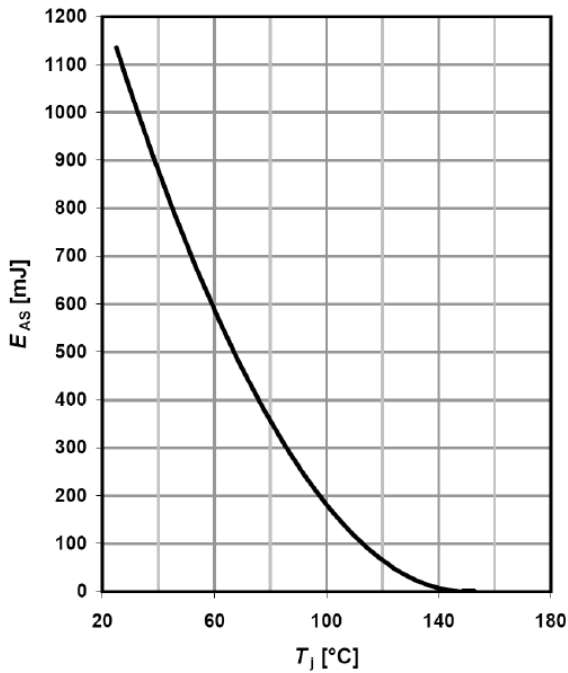
$I_D=f(V_{GS}); V_{DS}=20V$

Typ. gate charge



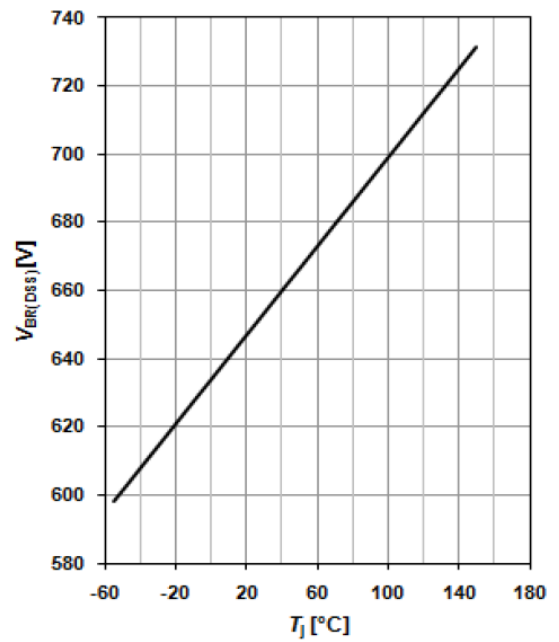
$V_{GS}=f(Q_{gate}), I_D=26.3 A$  pulsed

Avalanche energy



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

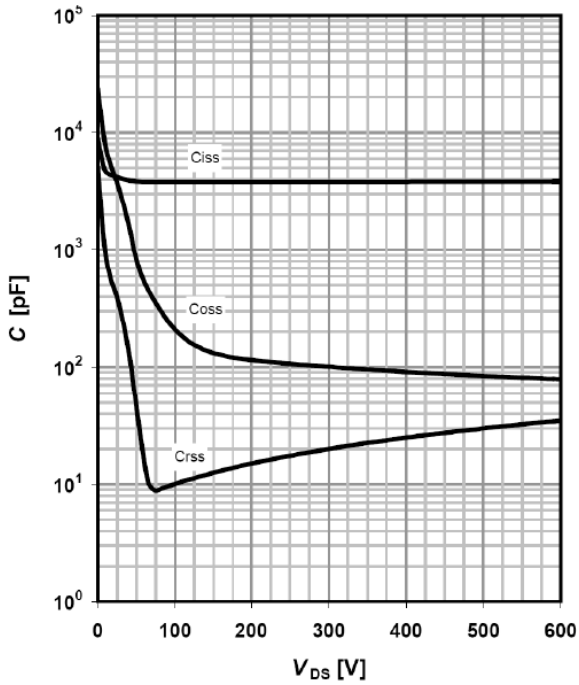
Drain-source breakdown voltage



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

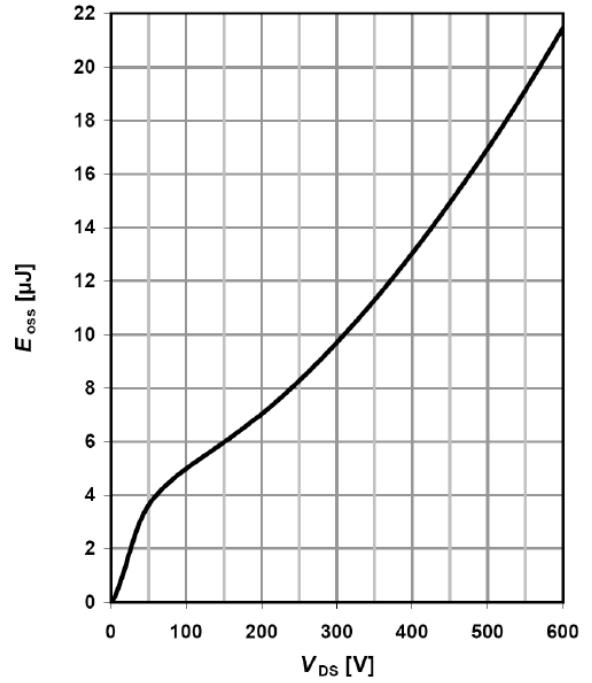
Typical characteristics Diagrams

Typ. capacitances



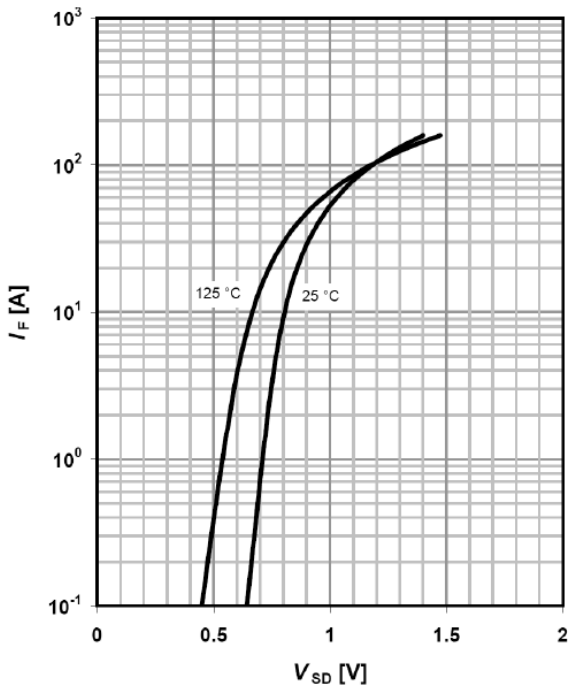
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

Typ.  $C_{oss}$  stored energy



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

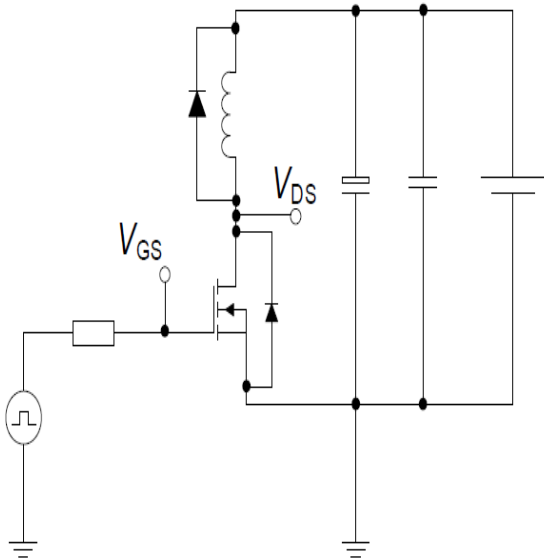
Forward characteristics of reverse diode



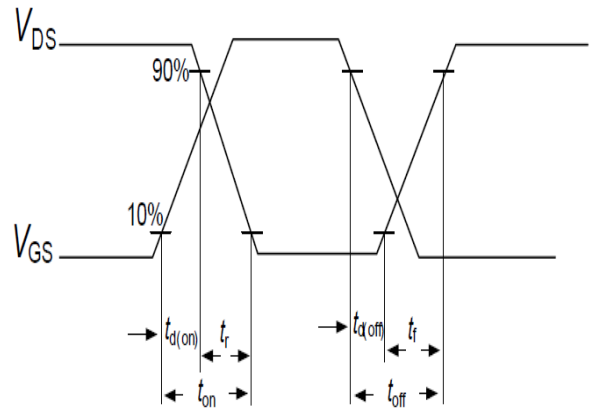
$I_F=f(V_{SD}); \text{parameter: } T_j$

Switching times test circuit and waveform for inductive load

Switching times test circuit for inductive load

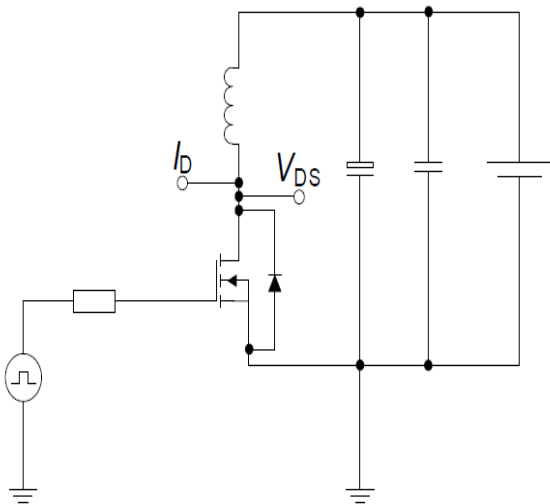


Switching time waveform

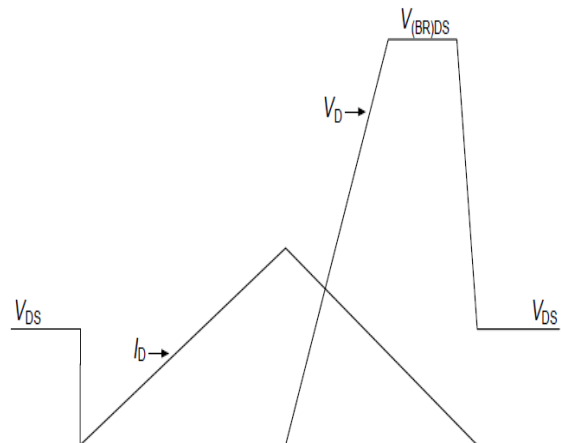


Unclamped inductive load test circuit and waveform

Unclamped inductive load test circuit

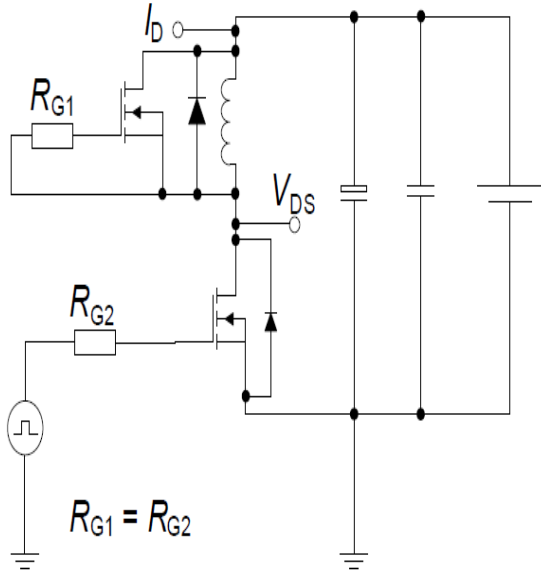


Unclamped inductive waveform

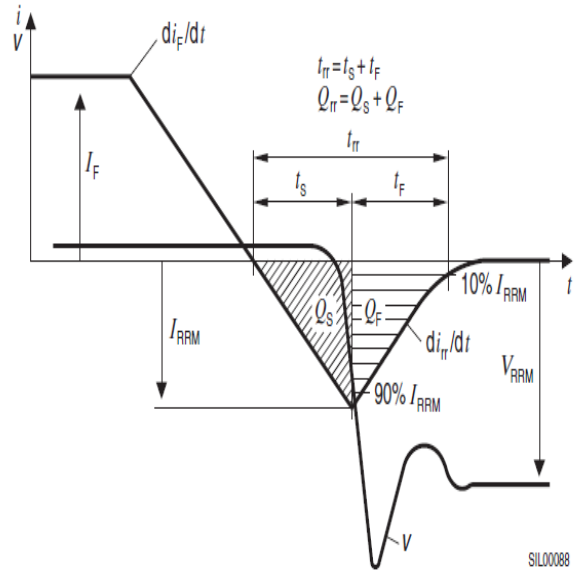


Typical Test Circuit

Test circuit for diode characteristics

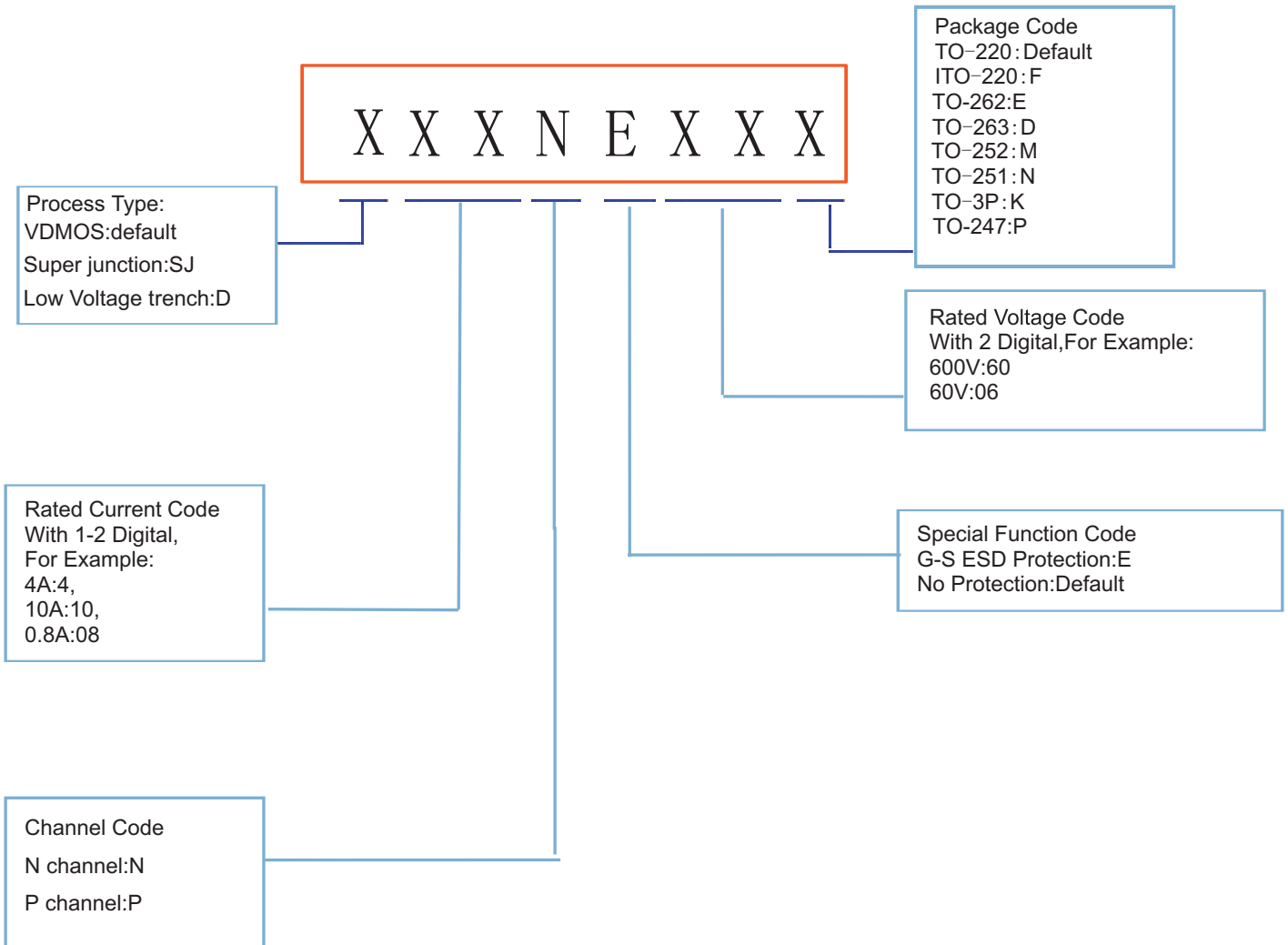


Diode recovery waveform

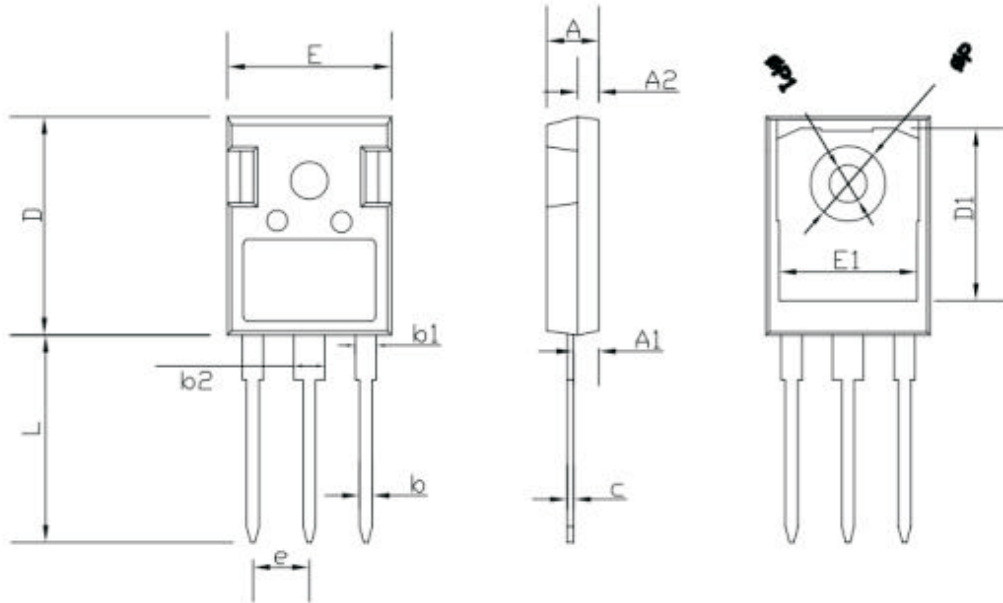




Product Names Rules



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

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