

# Product Specification



SGT280N60W3/SGF280N60W3  
600V N-Channel MOSFET

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# Catalogue

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## SGT280N60W3/SGF280N60W3

### 600V N-Channel MOSFET

600V @Tjmax, 15A, 0.280Ω

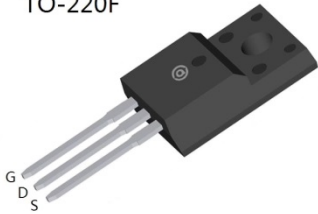
#### Features

- RDS(on) = 0.280Ω (Max.)@ VGS = 10V, ID = 7.5A
- Ultra low gate charge ( Typ. Qg = 35nC)
- Low effective output capacitance
- 100% avalanche tested
- RoHS compliant

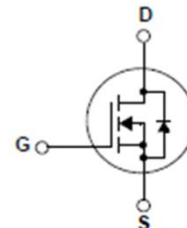
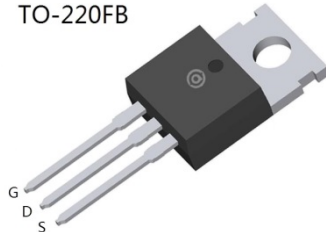
#### Description

The WinMOS<sup>®</sup> MOSFET, SG's W3 series of high voltage super-junction MOSFETs, employs a deep trench filling process that differentiates it from preceding multi-epi based technologies. By utilizing this advanced technology and precise process control, WinMOS<sup>®</sup> provides world class Rsp, superior switching performance and ruggedness. This WinMOS<sup>®</sup> fits the industry's AC-DC SMPS requirements for PFC, server/telecom power, FPD TV power, ATX power, and industrial power applications.

TO-220F



TO-220FB



### Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	Id	Tc=25°C	15	A
		Tc=100°C	9	
Pulsed drain current	Id,pulse	Tc=25°C	45	
Avalanche energy, single pulse	Eas	Id=5A, VDD=50V	350	mJ
Avalanche energy, repetitive	Ear	Id=15A, VDD=50V	0.8	mJ
Avalanche current	Iar		15	A
MOSFET dv/dt ruggedness	dv/dt	VDS=480V, ID=7.5A, Tj=125°C	15	V/ns
Gate source voltage	Vgs	static	±20	V
		AC (f>1 Hz)	±30	V
Power dissipation for TO-220FB	Ptot	Tc=25°C	125	W
Power dissipation for TO-220F	Ptot	Tc=25°C	33	W
Operating and storage temperature	Tj, Tstg		-55~150	°C

### Thermal Characteristics

Parameter	Symbol	SGT280N60W3	SGF280N60W3	Unit
Junction to case	RthJC	1	3.8	°C/W
Junction to ambient	RthJA	60.5	80	°C/W
Soldering temperature, wavesoldering only allowed at leads	Tsold	280	280	°C

**Electrical Characteristics at Tj=25°C**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-source Breakdown voltage	V(BR)Dss	Vgs=0V, ID=1mA	630	---	---	V
Gate threshold voltage	Vgs(th)	Id=250uA, Vds=Vgs	2.8	3.5	4.2	V
Zero gate voltage drain current	IDSS	VDS=600V, Vgs=0V Tj=25°C	---	---	1	uA
		VDS=600V, Vgs=0V Tj=150°C	---	---	10	
Gate source leakage current	Igss	Vgs=20V, Vds=0V	---	---	100	nA
Drain source on-state resistance	RDS(on)	Vgs=10V, ID=7.5A Tj=25°C	---	0.25	0.28	Ω
		Vgs=10V, ID=7.5A Tj=150°C	---	0.71	---	
Gate resistance	Rg	f=1 MHz, open drain	---	0.5	---	Ω

**Dynamic / Switching Characteristics**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
input capacitance	Ciss	Vds=100V Vgs=0V f=1MHz	---	1400	---	pF
Output capacitance	Coss		---	350	---	
Reverse transfer capacitance	Crss		---	80	---	
Turn on delay time	Td(on)	Vdd=400V, Vgs=0/10V Id=7.5A Rg=2.5 ohm	---	12	---	ns
rise time	Tr		---	8	---	
Turn off delay time	Td(off)		---	40	---	
Fall time	Tf		---	10	---	
Gate to source charge	Qgs	Vdd=400V, Id=7.5A Vgs=0 to 10V	---	6	---	nC
Gate to drain charge	Qgd		---	12	---	
Gate charge total	Qg		---	35	---	
Gate plateau voltage	V <sub>plateau</sub>		---	5.1	---	

**Drain-Source Diode Characteristics**

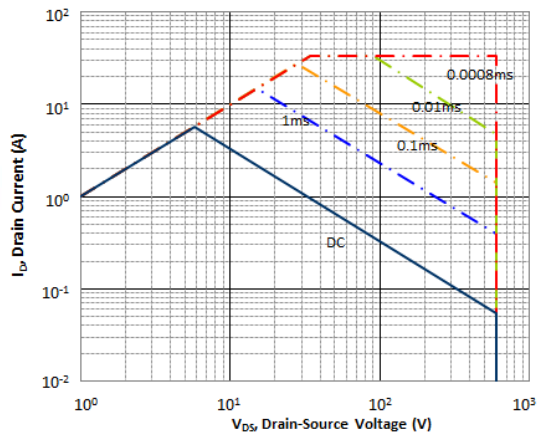
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Maximum Continuous Drain to Source Diode Forward current	Isd	Tc=25°C	---	---	15	A
Maximum Pulsed Drain to Source Diode Forward current	ISDM	Tc=25°C	---	---	45	A
Drain to Source Diode Forward Voltage	VSD	VGS=0V, ISD=7.5A, TJ=25°C	---	0.75	1.2	V
Reverse Recovery Time	Trr	VDD=480V, VGS=0V, ISD=7.5A dIF/dt = 100A/μs TJ=25°C	---	400	---	ns
Reverse Recovery Charge	Qrr		---	5	---	μC
Peak reverse recovery current	Irrm		---	45	---	A

**Typical Performance Characteristics**

**1 Safe operating area (FullPAK)**

$I_D=f(V_{DS}); T_C=25^{\circ}C; D=0$

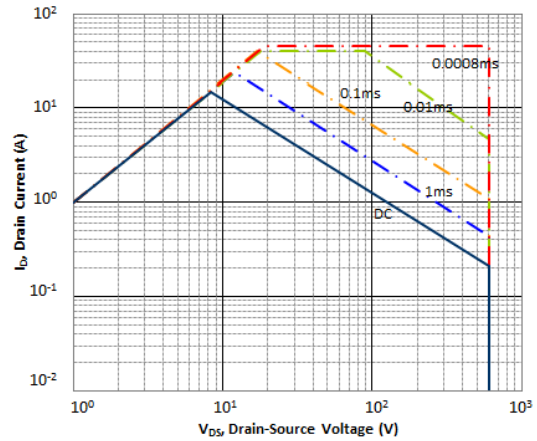
parameter:  $t$



**2 Safe operating area (Non FullPAK)**

$I_D=f(V_{DS}); T_C=25^{\circ}C; D=0$

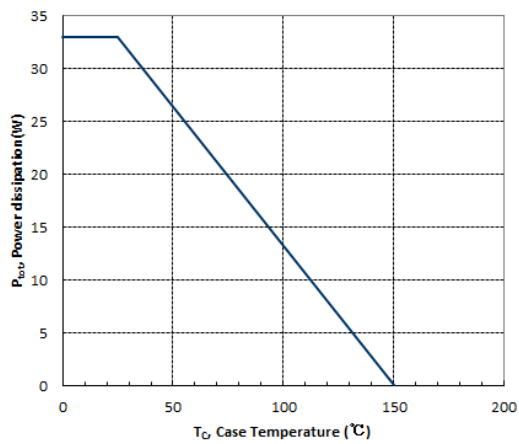
parameter:  $t$



**3 Power dissipation (FullPAK)**

$P_{tot}=f(T_C)$

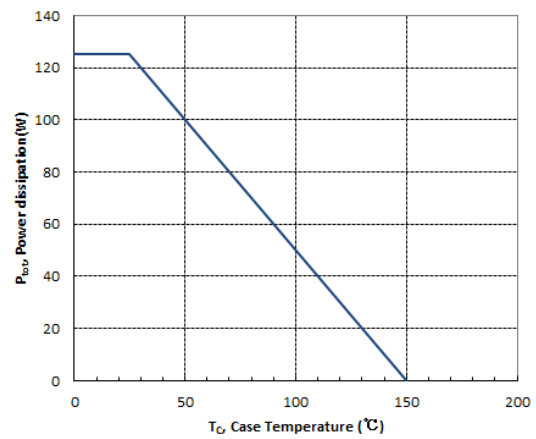
parameter:  $t$



**4 Power dissipation (Non FullPAK)**

$P_{tot}=f(T_C)$

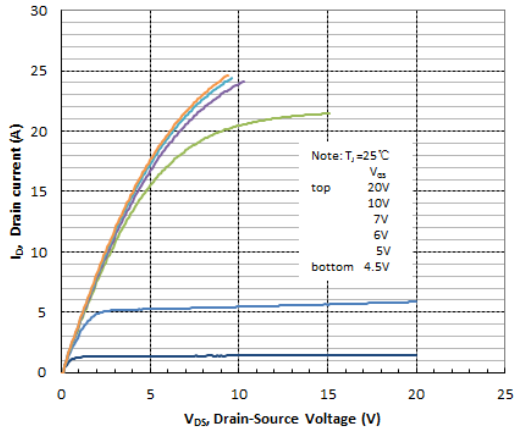
parameter:  $t$



**5 Typ. output characteristics**

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

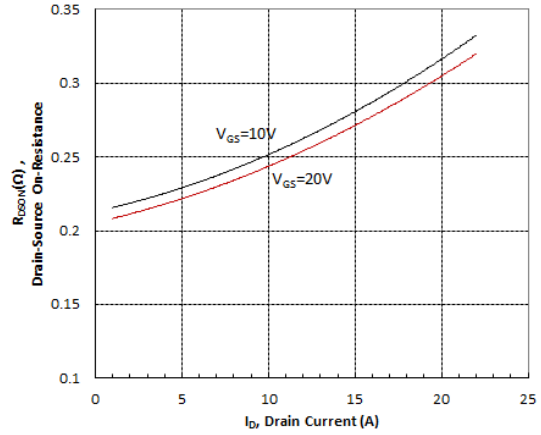
parameter:  $V_{GS}$



**6 Typ. drain-source on-state resistance**

$R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

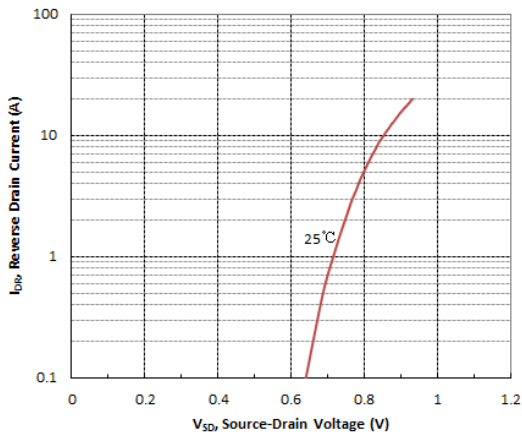
parameter:  $V_{GS}$



**7 Forward characteristics of reverse diode**

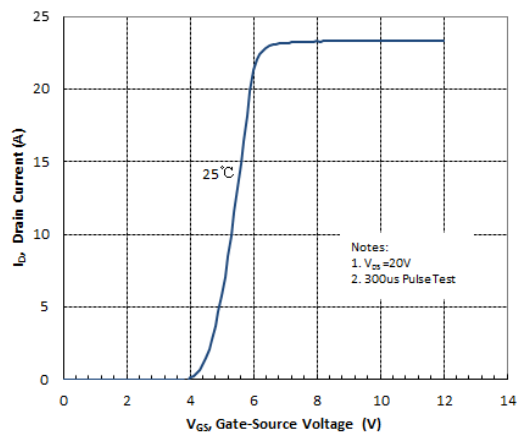
$I_D = f(V_{SD})$

parameter:  $T_j$



**8 Typ. transfer characteristics**

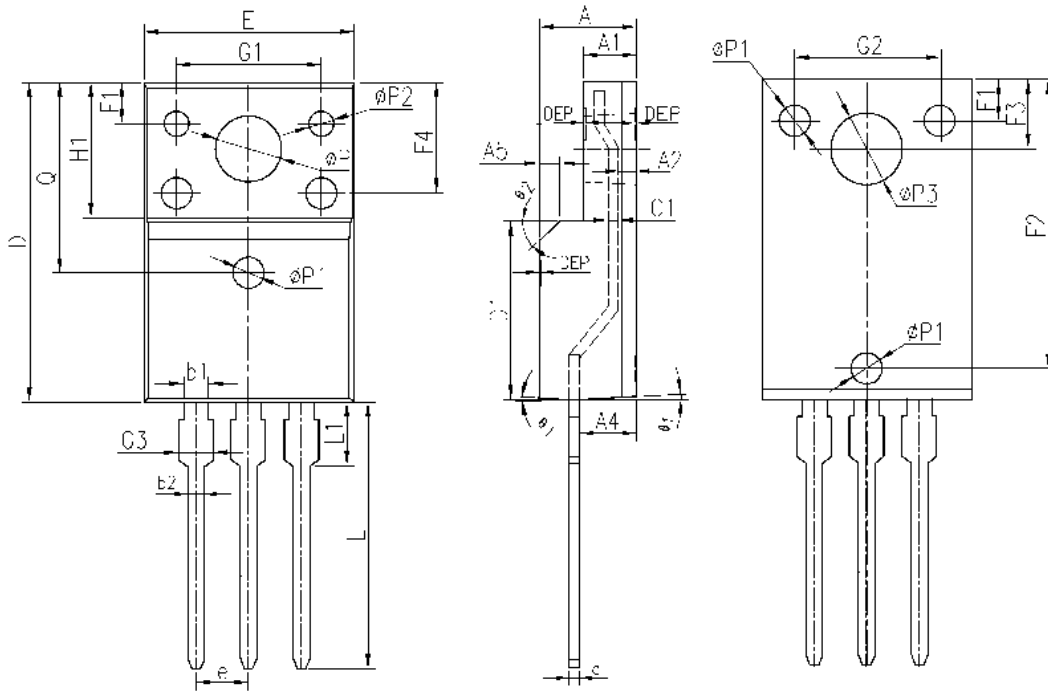
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|/R_{DS(on)max}$





**Mechanical Dimensions**

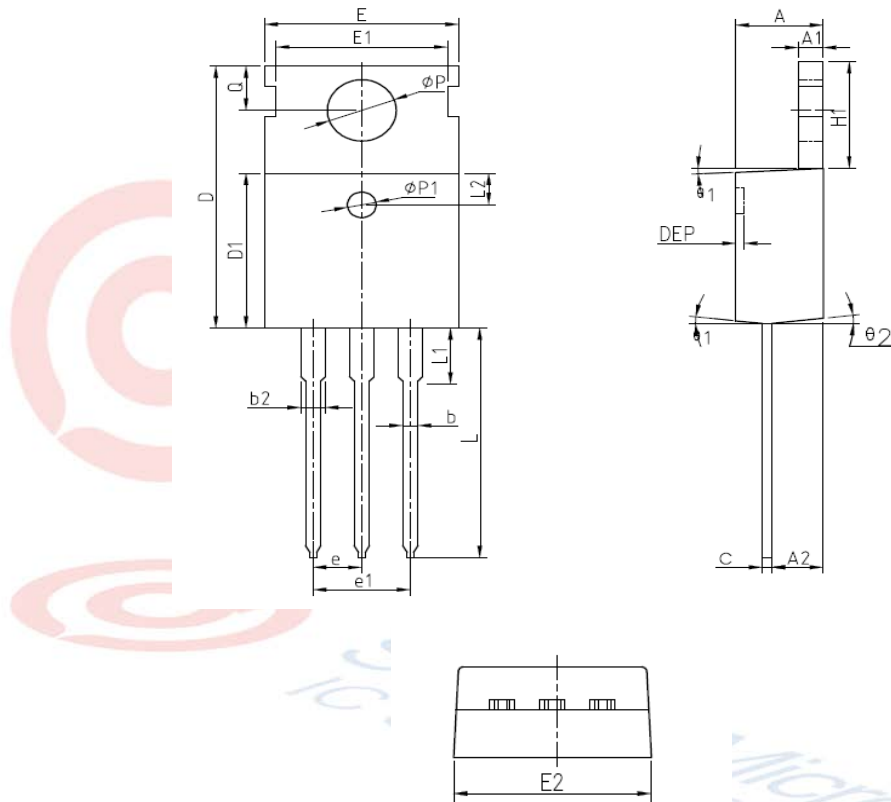
**TO-220-F-3L**



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	Min.	Norm.	Max.		Min.	Norm.	Max.
E	10.04	10.20	10.36	ΦP1	1.40	1.50	1.60
A	4.50	4.70	4.90	ΦP2	1.15	1.20	1.25
A1	2.34	2.54	2.74	ΦP3	3.45REF		
A2	0.95	1.05	1.15	θ1	5°	7°	9°
A4	2.65	2.75	2.85	θ2	—	45°	—
A5	1.00REF			DEP	0.05	0.10	0.15
c	0.42	0.50	0.58	F1	1.90	2.00	2.10
c1	0.42	0.50	0.58	F2	13.80	13.90	14.00
D	15.67	15.87	16.07	F3	3.20	3.30	3.40
Q	9.20REF			F4	5.30	5.40	5.50
H1	6.70REF			G1	6.60	6.70	6.80
e	2.54BSC			G2	6.90	7.00	7.10
ΦP	3.183REF			G3	1.10	1.30	1.50
L	12.78	12.98	13.18	b1	1.05	1.20	1.35
L1	3.25	3.45	3.65	b2	0.70	0.80	0.85
D1	9.17REF						

**Mechanical Dimensions**

**TO-220-FB-3L**



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	Min.	Norm.	Max.		Min.	Norm.	Max.
<b>A</b>	4.40	4.57	4.70	<b><math>\phi P1</math></b>	1.40	1.50	1.60
<b>A1</b>	1.27	1.30	1.37	<b>e</b>	2.54BSC		
<b>A2</b>	2.35	2.40	2.50	<b>e1</b>	5.08BSC		
<b>b</b>	0.77	0.80	0.90	<b>H1</b>	6.40	6.50	6.60
<b>b2</b>	1.17	1.27	1.36	<b>L</b>	12.75	13.50	13.65
<b>c</b>	0.48	0.50	0.56	<b>L1</b>	—	3.10	3.30
<b>D</b>	15.40	15.60	15.80	<b>L2</b>	2.50REF		
<b>D1</b>	9.00	9.10	9.20	<b><math>\phi P</math></b>	3.50	3.60	3.63
<b>DEP</b>	0.05	0.10	0.20	<b>Q</b>	2.73	2.80	2.87
<b>E</b>	9.80	10.00	10.20	<b><math>\theta_1</math></b>	5°	7°	9°
<b>E1</b>	—	8.70	—	<b><math>\theta_2</math></b>	1°	3°	5°
<b>E2</b>	9.80	10.00	10.20	<b><math>\theta_3</math></b>	1°	3°	5°

## Revision History

Version	Update date	Revised Content
V0.5	2013-11-12	Original
V1.0	2014-3-7	add plots of products' characteristics

### Remarks:

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