

100V N-Channel SGT Enhancement Mode MOSFET

Description

The PECN1040D6 uses ShieldGate Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

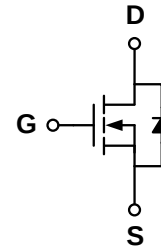
General Features

- ◆ $V_{DS} = 100V$ $I_D = 40A$
 $R_{DS(ON)}(Typ.) = 14m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 18m\Omega$ @ $V_{GS} = 4.5V$
- ◆ Excellent gate charge x $R_{DS(on)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(on)}$
- ◆ 150 °C operating temperature
- ◆ 100% UIS tested

Application

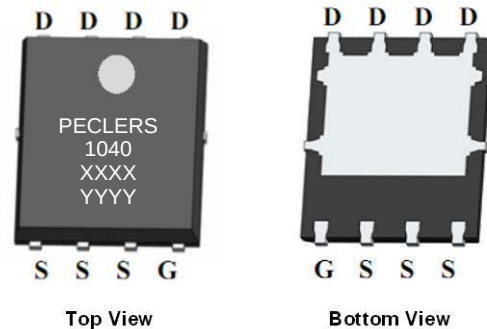
- ◆ Synchronous Rectification in DC/DC and AC/DC Converters
- ◆ Industrial and Motor Drive applications

Schematic diagram



Marking and pin assignment

PDFN5*6-8L-A



XXXXXX—Wafer Information
 YYYYYY—Date Code



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN1040D6	-55°C to +150°C	PDFN5*6-8L-A	5000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	100	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25°C	I_D	40	A
	TC=70°C		32	
Pulsed Drain Current		I_{DP}	160	A
Avalanche energy(L=0.1mH)		E_{AS}	45	mJ
Power Dissipation	TC=25°C	P_D	48	W
	TC=70°C		25	
Operating junction Temperature range		T_j	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	100	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
		T _J =75°C	-	-	5	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.7	2.5	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	14	18	mΩ
		V _{GS} =4.5V, I _D =20A		18	24	
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =5A	-	10	-	S
Diode Characteristics						
Diode Forward Voltage	V _{SD}	I _{SD} =1A,V _{GS} =0V	-	0.7	1.2	V
Diode Continuous Forward Current	I _S		-	-	55	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =20A di/dt = 500A/μs	-	35	-	ns
Reverse Recovery Charge	Q _{rr}		-	50	-	nC
Dynamic Characteristics						
Gate Resistance	R _G	f=1.0MHz	-	0.8	1.6	Ω
Input capacitance	C _{ISS}	V _{GS} =0V ,V _{DS} =50V f=1.0MHz	-	1200	-	pF
Output capacitance	C _{OSS}		-	180	-	
Reverse transfer capacitance	C _{RSS}		-	8	-	
Turn-on delay time	t _{D(ON)}	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _G =3Ω	-	11	-	ns
Turn-on Rise time	tr		-	5	-	
Turn-off delay time	t _{D(OFF)}		-	21	-	
Turn-off Fall time	t _f		-	5	-	
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =50V, I _D =20A	-	20	-	nC
Gate-source charge	Q _{gs}		-	4	-	
Gate-drain charge	Q _{gd}		2	3.1	-	

Thermal Characteristics

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$\leq 10s$	$R_{\theta JA}$	20	25	$^\circ C/W$
Maximum Junction-to-Ambient ^A	Steady-State		45	55	
Maximum Junction-to-Lead ^B	Steady-State	$R_{\theta JC}$	2.1	2.6	

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

Typical Performance Characteristics

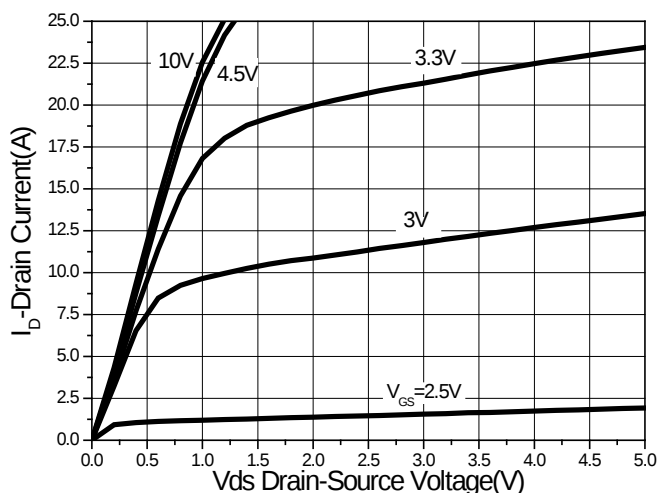


Fig1 Output Characteristics

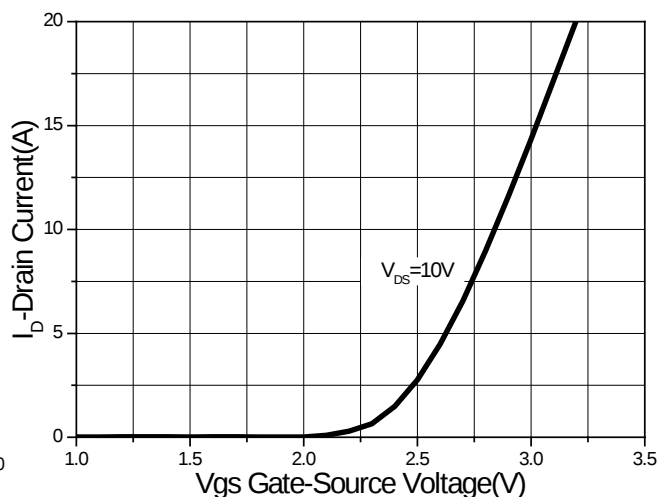


Fig2 Transfer Characteristics

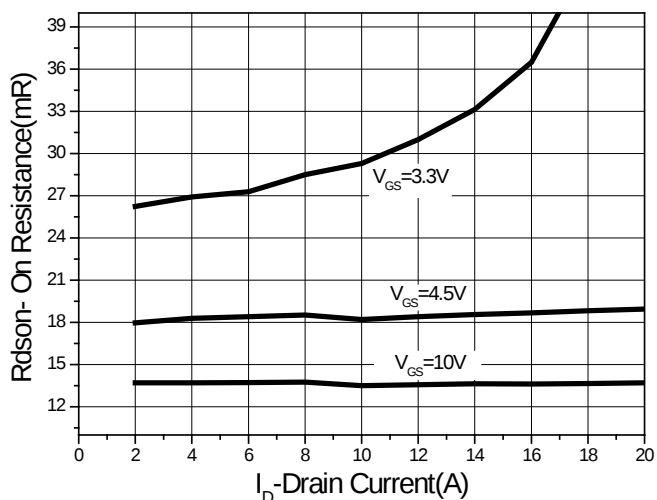


Fig3 $R_{DS(on)}$ -Drain current

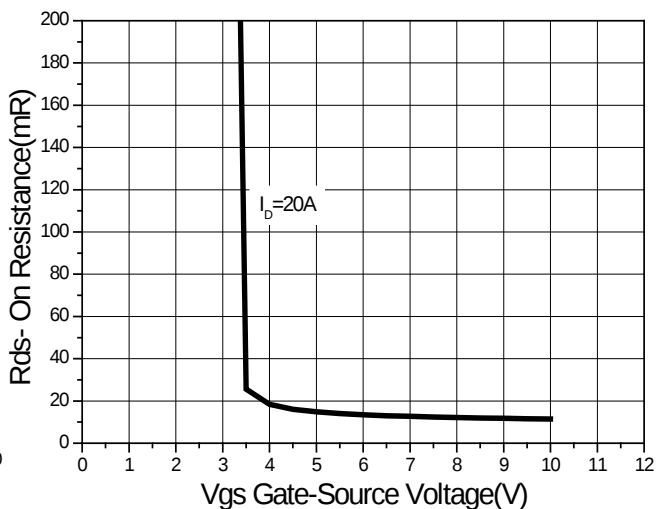


Fig4 $R_{DS(on)}$ -Gate Drain voltage

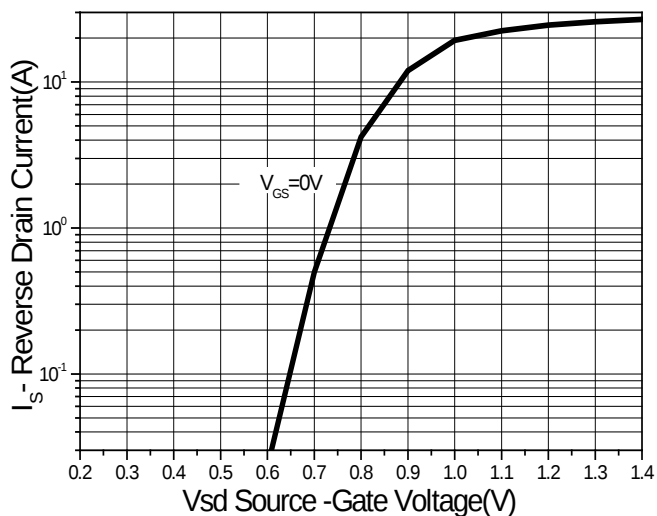


Fig5 Source-Drain Diode Forward

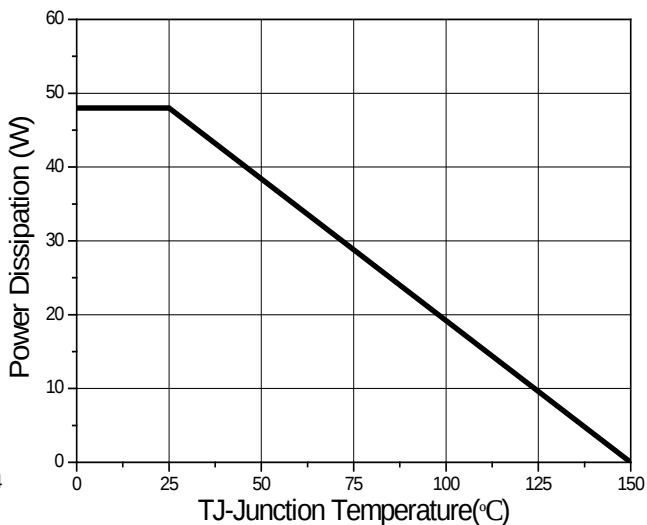


Fig6 Power De-rating

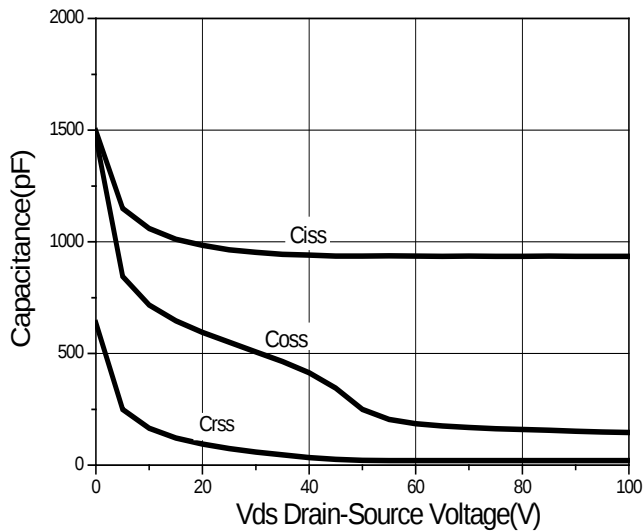


Fig7 Capacitance vs Vds

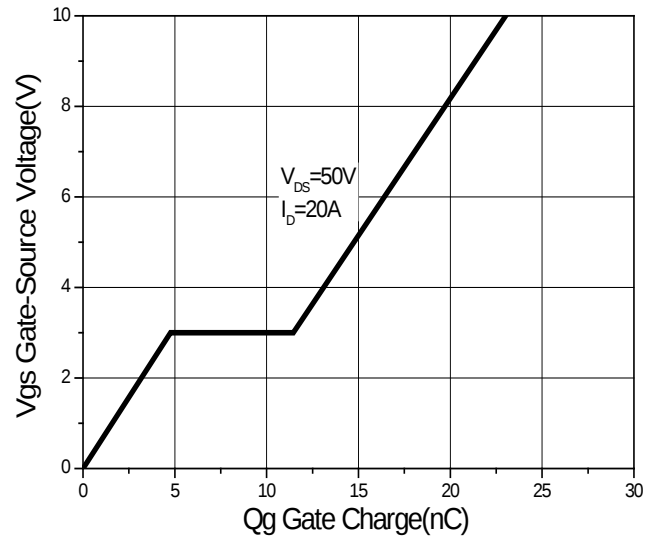


Fig8 Gate Charge

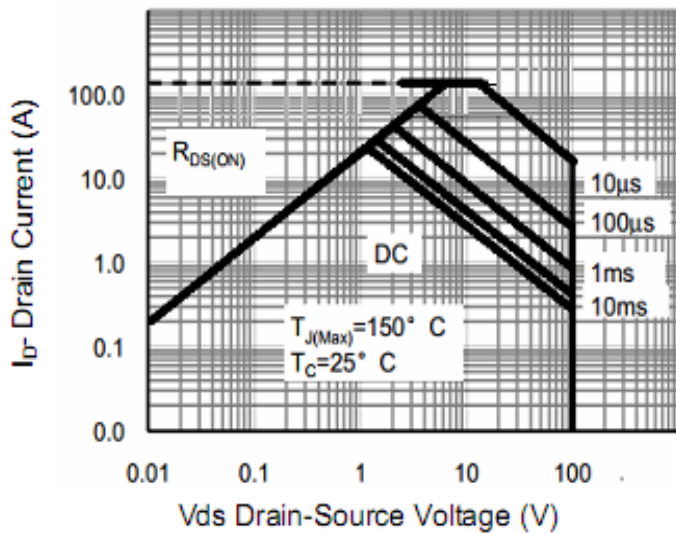


Fig9 Safe Operation Area

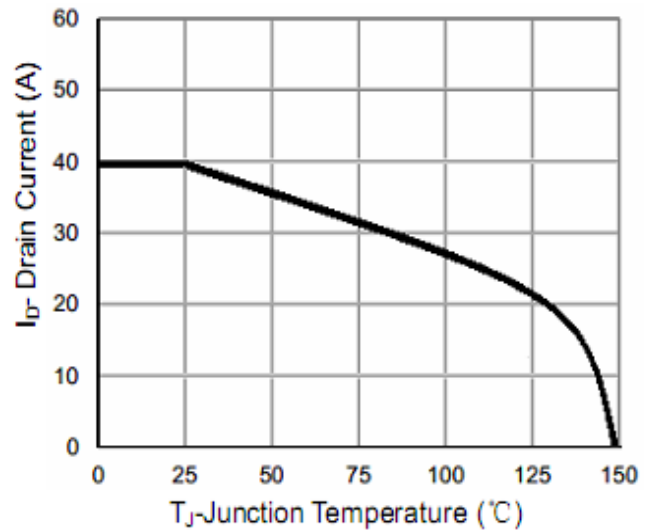


Fig10 Current De-rating

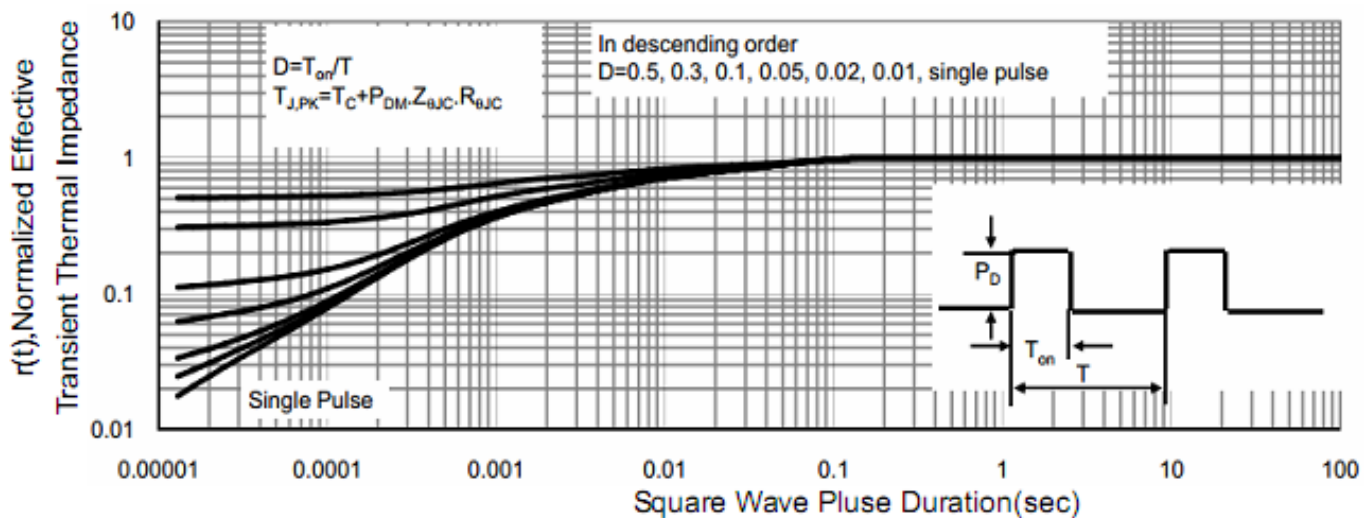
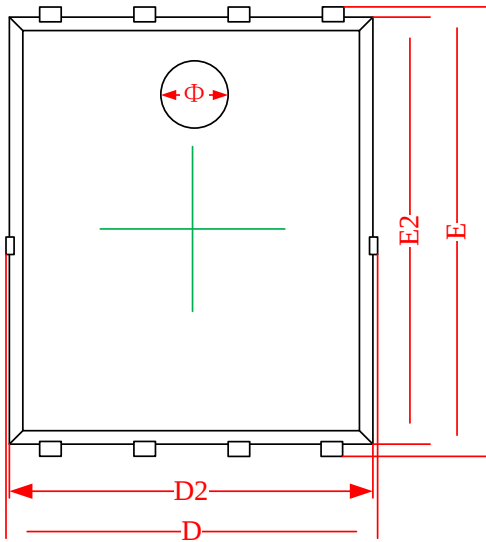


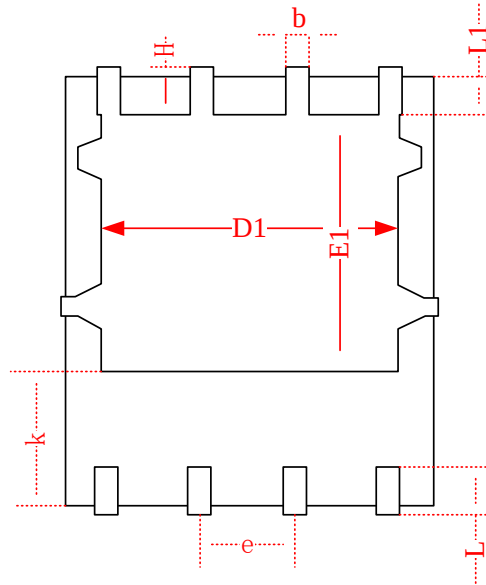
Fig11 Normalized Maximum Transient Thermal Impedance

- PDFN5*6-8L-A

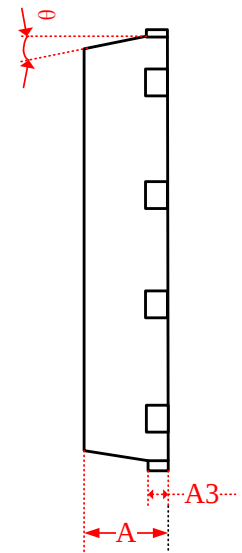
Top View



Bottom View



Side View



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.870	0.900	0.930	0.034	0.035	0.036
A3	0.152REF.			0.006REF.		
D	4.944	5.020	5.096	0.195	0.198	0.201
E	5.974	6.050	6.126	0.235	0.238	0.241
D1	3.910	4.010	4.110	0.154	0.158	0.162
E1	3.375	3.475	3.575	0.133	0.137	0.141
D2	4.870	4.900	4.930	0.192	0.193	0.194
E2	5.720	5.750	5.780	0.226	0.227	0.228
k	1.190	1.290	1.390	0.047	0.051	0.055
b	0.350	0.380	0.410	0.014	0.015	0.016
e	1.270TYP.			0.050TYP.		
L	0.559	0.635	0.711	0.022	0.025	0.028
L1	0.424	0.500	0.576	0.017	0.020	0.023
H	0.574	0.650	0.726	0.023	0.026	0.029
θ	10°	11°	12°	10°	11°	12°
Φ	1.150	1.200	1.250	0.045	0.047	0.049