

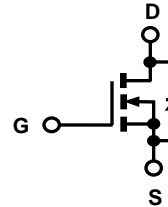


PMG13N65P N-Channel Enhancement Mode MOSFET

Features

- Low $r_{DS(on)}$
- Ultra Low Gate Charge
- High dv/dt capability
- High Unclamped Inductive Switching (UIS) capability
- High peak current capability
- Increased transconductance performance
- Optimized design for high performance power systems

Product Summary			
I_D	$T_A=25^\circ\text{C}$	13A	Max
$V_{(BR)DSS}$	$I_D=250\mu\text{A}$	650V	Min
$r_{DS(on)}$	$V_{GS}=10\text{V}$	0.25 Ω	Typ
Q_g	$V_{DS}=480\text{V}$	59nC	Typ



TO220

Standard Metal
Heatsink

1=Gate, 2=Drain,
3=Source.

Maximum ratings^b, at $T_j=25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_c=25^\circ\text{C}$	13	A
Pulsed drain current	$I_{D, pulse}$	$T_c=25^\circ\text{C}$	35	A
Avalanche energy, single pulse	E_{AS}	$I_D=6.5\text{A}$	460	mJ
Avalanche current, repetitive	I_{AR}	limited by $T_j\text{max}$	6.5	A
MOSFET dv/dt ruggedness	dv/dt	$V_{DS}=480\text{V}$, $I_D=13\text{A}$, $T_j=125^\circ\text{C}$	50	V/ns
Gate source voltage	V_{GS}	static	± 20	V
		AC ($f > 1\text{Hz}$), $V_{GS}=30\text{V}$	± 20	
Power dissipation	P_{tot}	$T_c=25^\circ\text{C}$	160	W
Operating and storage temperature	T_j, T_{stg}		-55 to +150	$^\circ\text{C}$
Mounting torque		M 2.5 screws	50	Ncm

a When mounted on 1inch square 2oz copper clad FR-4

b Preliminary Data Sheet – Specifications subject to change

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case ^a	R_{thJC}		-	-	0.8	°C/W
Thermal resistance, junction-ambient ^a	R_{thJA}	leaded	-	-	39	
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics ^b, at $T_j=25^\circ\text{C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=250\mu\text{A}$	650	675	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.1	-	3.9	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$	-	0.1	1	μA
		$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_j=150^\circ\text{C}$	-	-	100	
Gate source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{ V}, V_{DS}=0\text{V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=6.5\text{A}, T_j=25^\circ\text{C}$	-	0.25	0.28	Ω
		$V_{GS}=10\text{V}, I_D=6.5\text{A}, T_j=150^\circ\text{C}$	-	0.62	-	
Gate resistance	R_G	$f=1\text{ MHz}, \text{open drain}$	-	4.7	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V}, f=1\text{ MHz}$	-	1800	-	μF
Output capacitance	C_{oss}		-	600	-	
Reverse transfer capacitance	C_{rss}		-	5	-	
Transconductance	g_{fs}	$V_{DS}>2 \cdot I_D \cdot R_{DS}, I_D=6.5\text{A}$	-	15	-	S
Turn-on delay time	$t_{d(on)}$	$V_{DS}=380\text{V}, V_{GS}=10\text{V}, I_D=13\text{A}, R_G=4\Omega \text{ (External)}$	-	39	-	ns
Rise time	t_r		-	10	-	
Turn-off delay time	$t_{d(off)}$		-	55	-	
Fall time	t_f		-	6	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

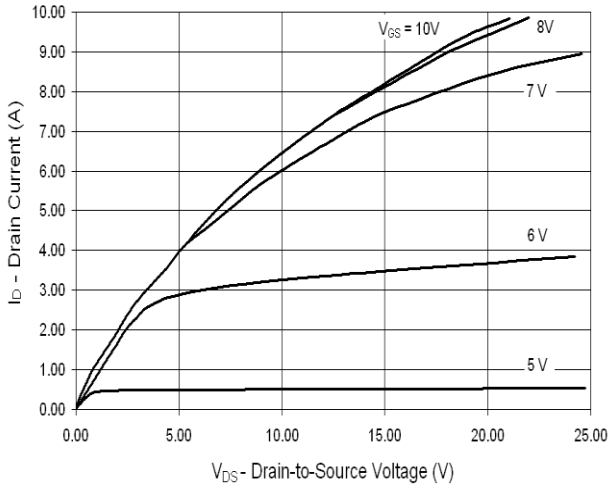
Gate charge characteristics

Gate to source charge	Q_{gs}	$V_{DS}=480\text{ V}, I_D=13\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	11	-	nC
Gate to drain charge	Q_{gd}		-	19	-	
Gate charge total	Q_g		-	59	-	
Gate plateau voltage	V_{plateau}		-	5.5	-	V

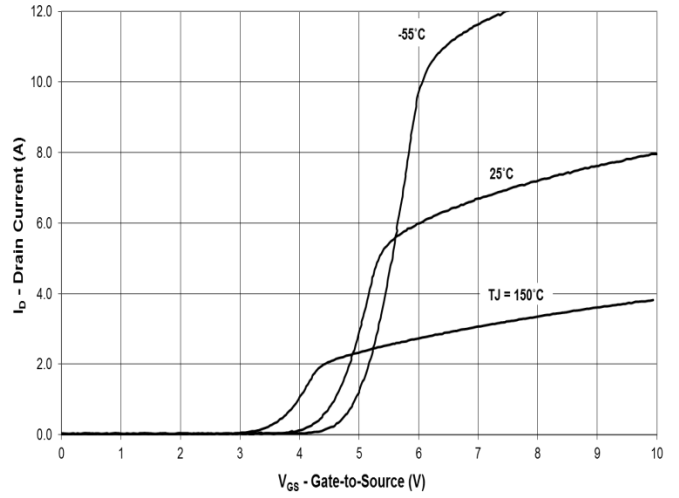
Reverse Diode

Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_S=I_F$	-	0.9	1.2	V
Reverse recovery time	t_{rr}	$V_{RR}=480\text{ V}, I_S=I_F,$ $d_{iF}/d_t=100\text{ A}/\mu\text{S}$	-	397	-	ns
Reverse recovery charge	Q_{rr}		-	6	-	μC
Peak reverse recovery current	I_{rm}		-	35	-	A

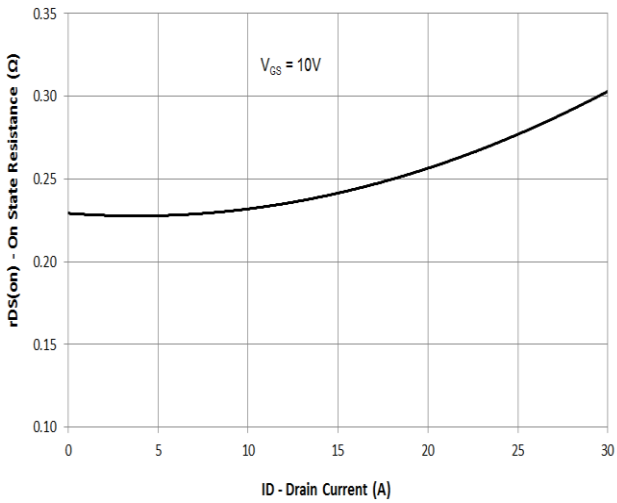
Output Characteristics



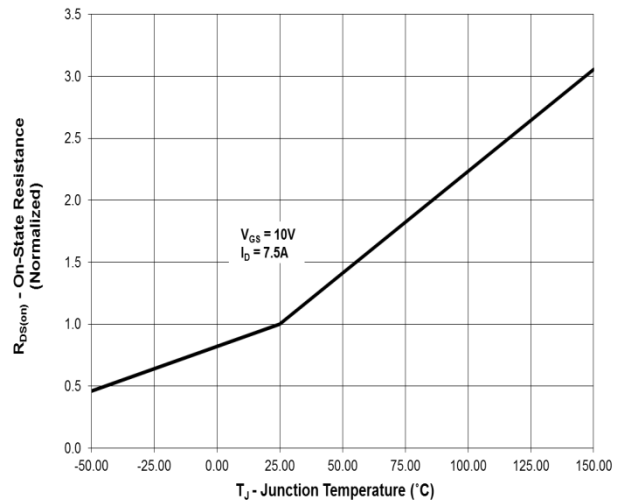
Transfer Characteristics



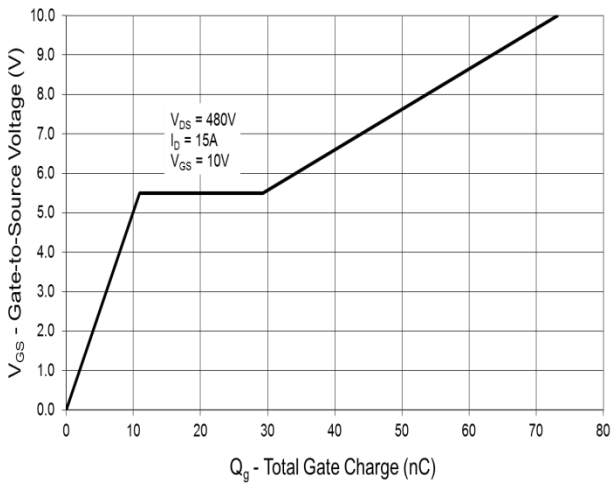
On State Resistance vs. Drain Current



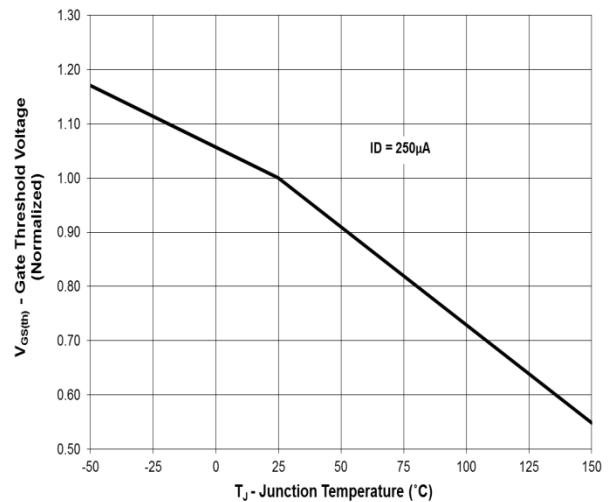
On-State Resistance vs. Junction Temperature



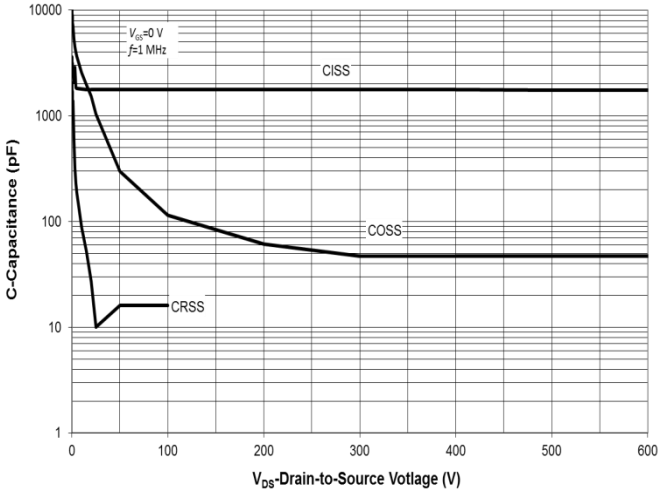
Gate Charge



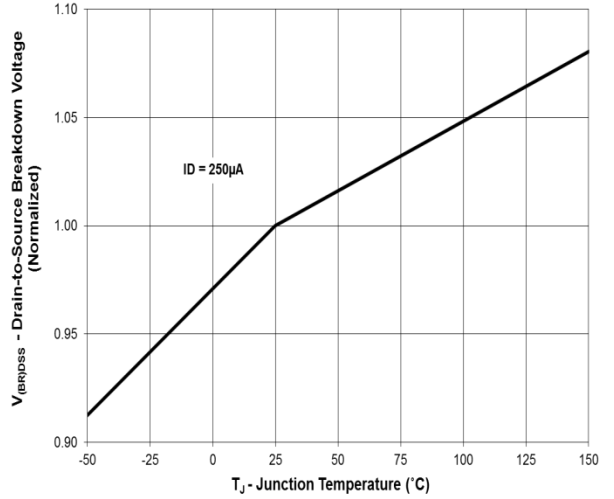
Gate Threshold Voltage vs. Junction Temperature



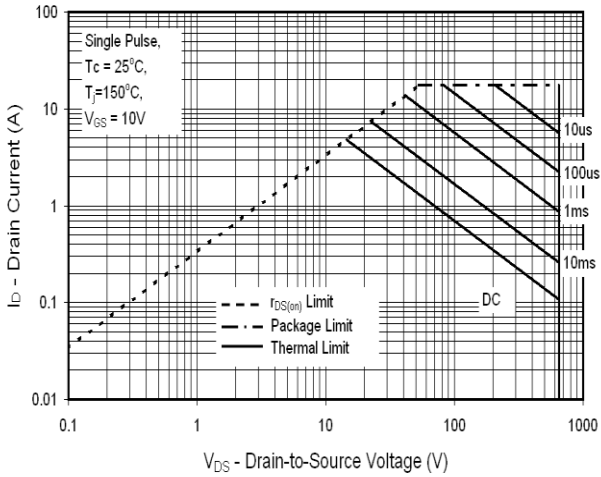
Capacitance



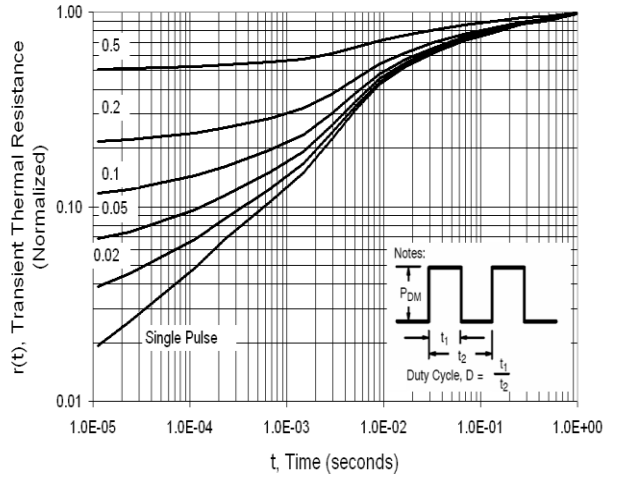
Drain-to-Source Breakdown Voltage vs. Junction Temperature

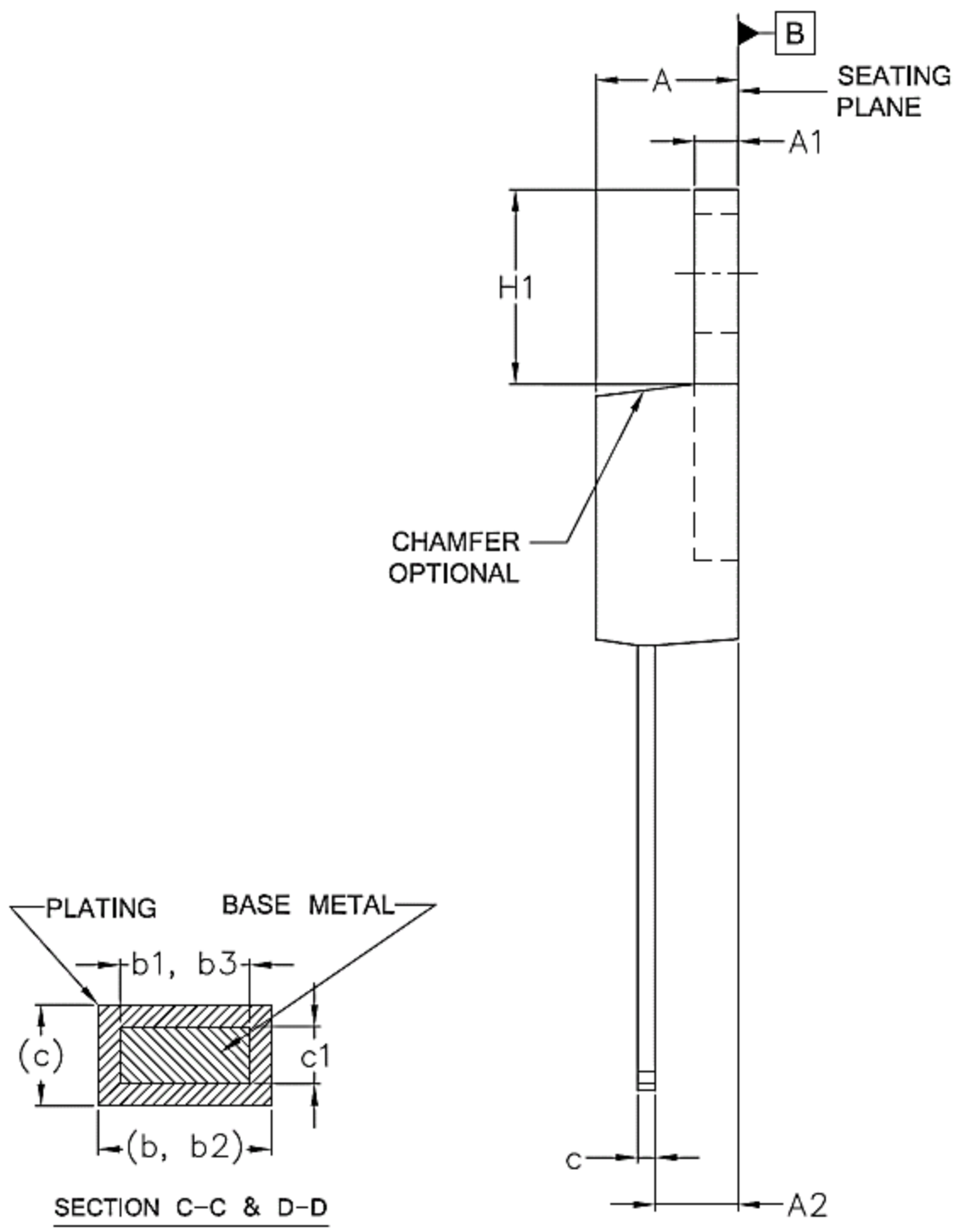


Maximum Rated Forward Biased Safe Operating Area



Transient Thermal Response, Junction-to-Case





SYMBOLS	DIMENSIONS			
	mm		Inch	
	MIN.	MAX.	MIN.	MAX.
A	3.556	4.826	0.140	0.190
A1	0.508	1.397	0.020	0.055
A2	2.032	2.921	0.080	0.115
b	0.381	1.016	0.015	0.040
b1	0.381	0.965	0.015	0.038
c	0.356	0.610	0.014	0.024
c1	0.356	0.559	0.014	0.022
D	14.224	16.510	0.560	0.650
D1	8.382	9.017	0.330	0.355
D2	12.192	12.878	0.480	0.507
E	9.652	10.668	0.380	0.420
E1	6.858	8.890	0.270	0.350
e	2.540 BSC		0.100 BSC	
H1	5.842	6.858	0.230	0.270
L	12.700	14.732	0.500	0.580
∅P	3.810	3.860	0.150	0.151
Q	2.540	3.048	0.100	0.120
b2	1.143	1.778	0.045	0.070
R	1.270 BSC		0.050 BSC	
L1	–	6.350	–	0.250
b3	1.143	1.727	0.045	0.068
f1	3.200 REF.		0.126 REF.	
f2	4.220 REF.		0.166 REF.	
j	1.750 REF.		0.069 REF.	
r	0.510 REF.		0.020 REF.	
N	TO-220-3L			