PE8215CM N and P Channel Enhancement Mode Power MOSFET

PE8215CM Description

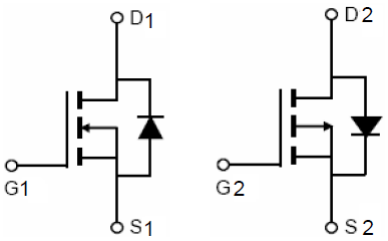
The PE8215CM uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE8215CM General Features

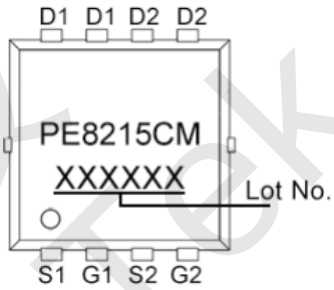
- **N-Channel**
- V_{DS} = 20V, I_D = 20A
  $R_{DS(ON)}$ < 11mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$ < 15mΩ @ V_{GS}=2.5V
- **P-Channel**
- V_{DS} = -20V, I_D = -20A
  $R_{DS(ON)}$ < 21mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$ < 28mΩ @ V_{GS}=-2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

PE8215CM Application

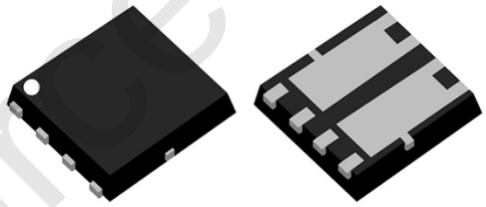
- DC motor
- PWM applications



Schematic diagram



Marking and pin assignment



PDFN3.3x3.3-8L

PE8215CM Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	±12	±12	V
Drain Current-Continuous	I_D	20	-20	A
Drain Current-Continuous (TC=100℃)	I_D	13	-13	A
Pulsed Drain Current (Note 1)	I_{DM}	80	-80	A
Maximum Power Dissipation	P_D	16.7	21	W
Single Pulsed Avalanche Energy (L=0.1mH)	E_{AS}	23	26	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150		℃

PE8215CM Thermal Characteristic

Parameter	Symbol	N-Channel	P-Channel	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	7.5	6	℃/W

PE8215CM N-Channel Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=18V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.45	0.7	1.1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V,I_D=5A	-	9	11	mΩ
		V_{GS}=2.5V,I_D=3A	-	12	15	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz	-	835	-	pF
Output Capacitance	C_{oss}		-	130	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	120	-	pF
Gate Resistance	R_g	V_{DS}=0V, V_{GS}=0V, F=1.0MHz	-	1.2	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V, R_L=1Ω, V_{GS}=4.5V, R_G=3Ω	-	13	-	nS
Turn-on Rise Time	t_r		-	63.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	t_f		-	8.2	-	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=5A,V_{GS}=4.5V	-	20	-	nC
Gate-Source Charge	Q_{gs}		-	1.7	-	nC
Gate-Drain Charge	Q_{gd}		-	2.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V, I_S=1A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	20	A
Reverse Recovery Time	t_{rr}	I_F=5A, di/dt=60A/μs	-	29.4	-	nS
Reverse Recovery Charge	Q_{rr}		-	6.8	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

PE8215CM Typical Electrical and Thermal Characteristics

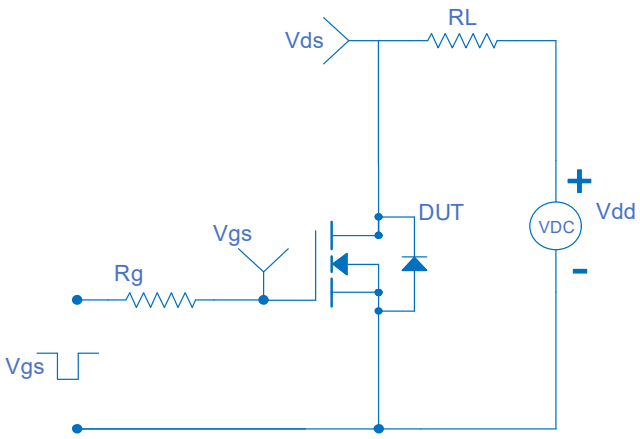


Figure 1 Switching Test Circuit

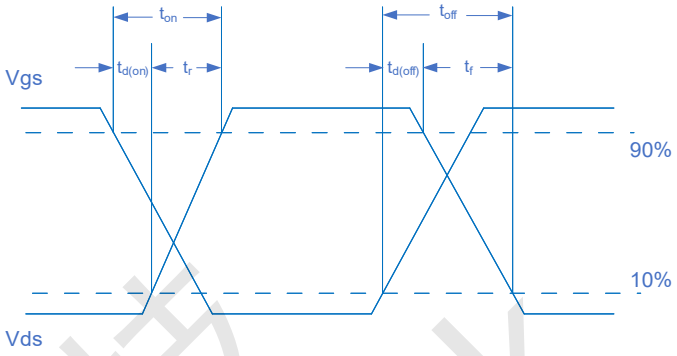


Figure 2 Switching Waveform

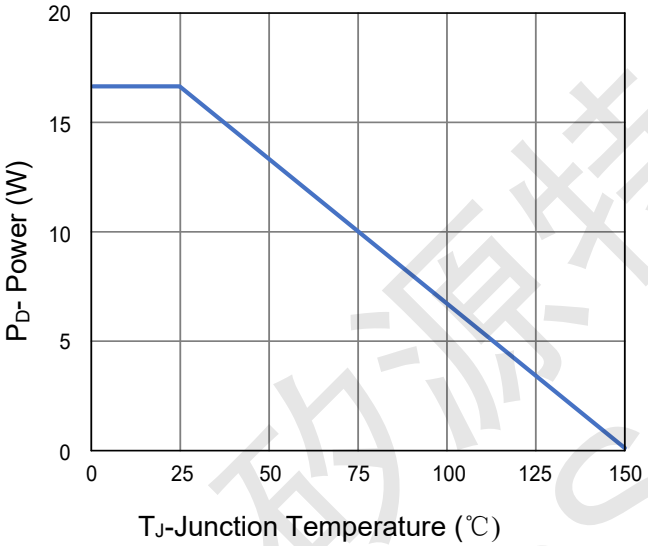


Figure 3 Power De-rating

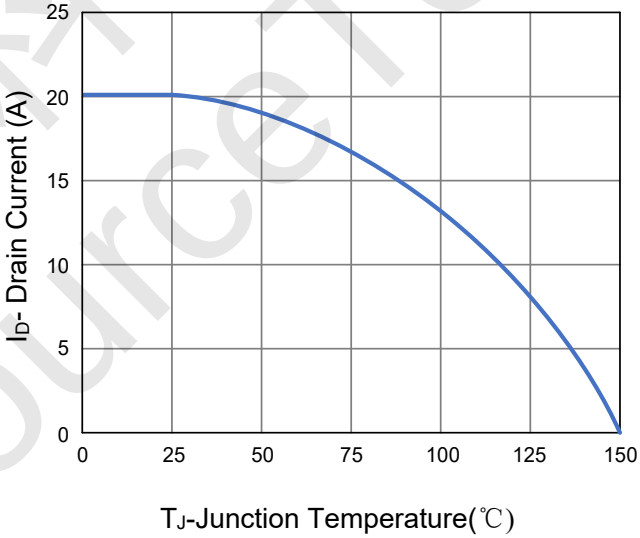


Figure 4 Drain Current

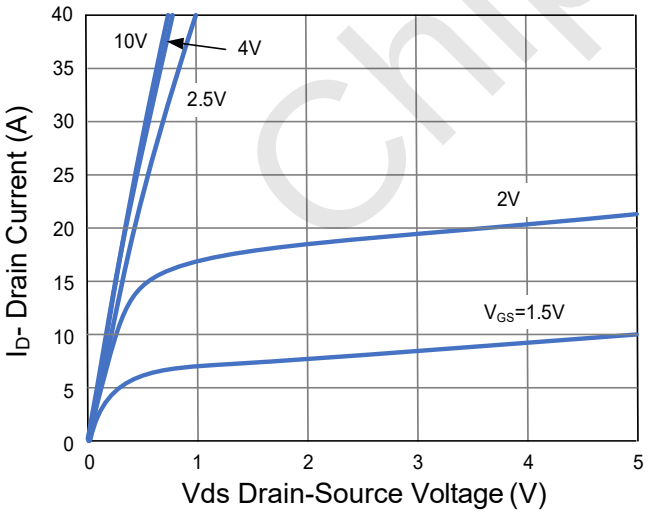


Figure 5 Output Characteristics

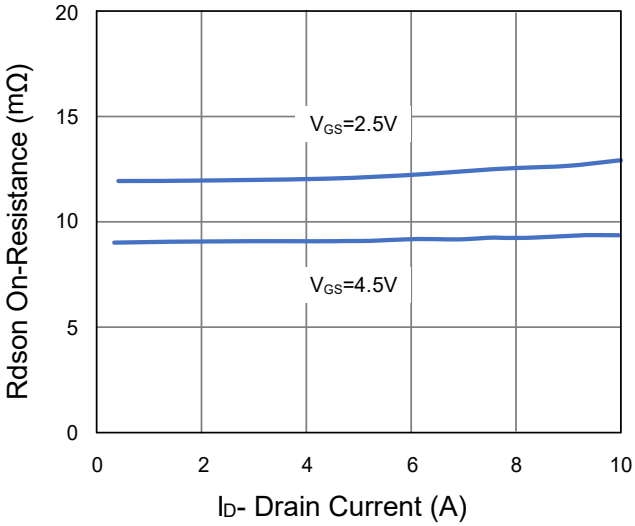


Figure 6 Rdson vs Drain Current

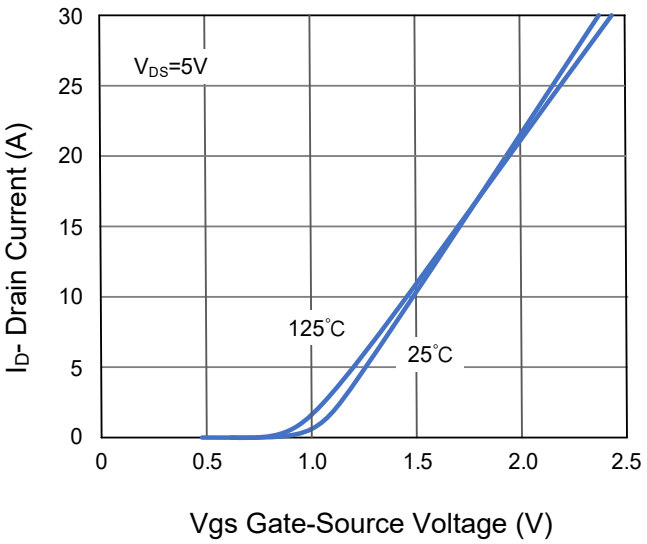


Figure 7 Transfer Characteristics

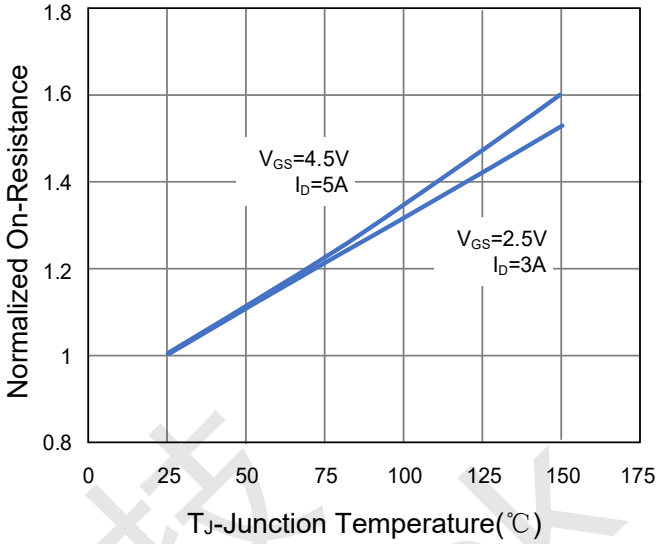


Figure 8 Rdson vs Junction Temperature

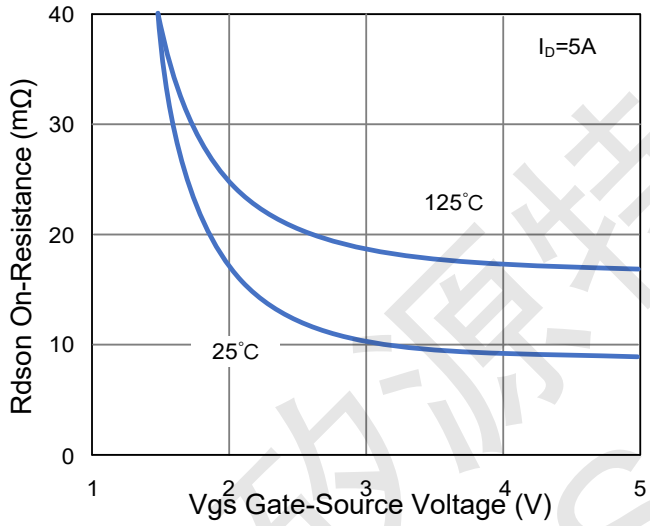


Figure 9 Rdson vs Vgs

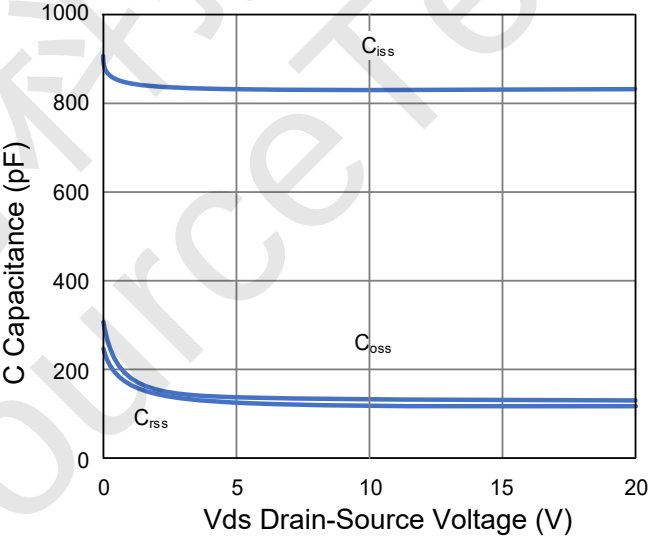


Figure 10 Capacitance vs Vds

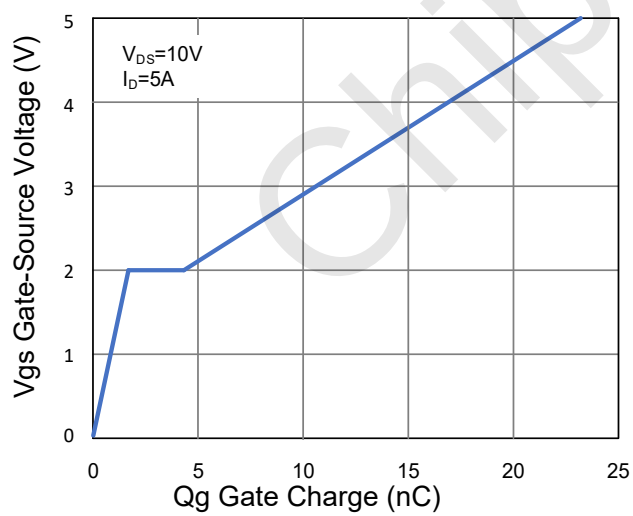


Figure 11 Gate Charge

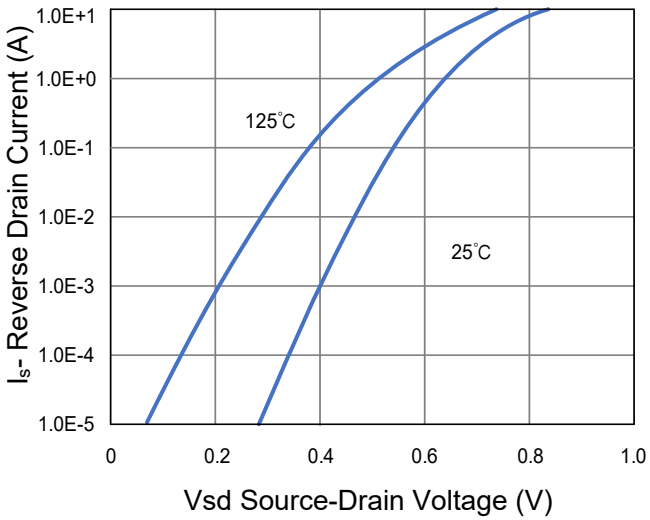


Figure 12 Source- Drain Diode Forward

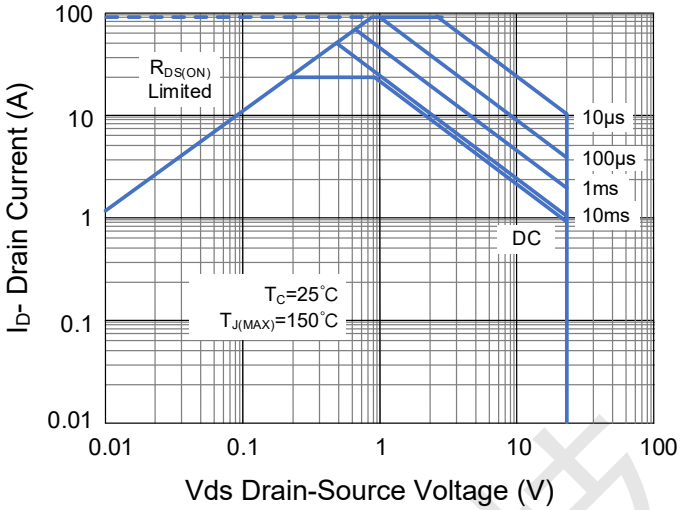


Figure 13 Safe Operation Area

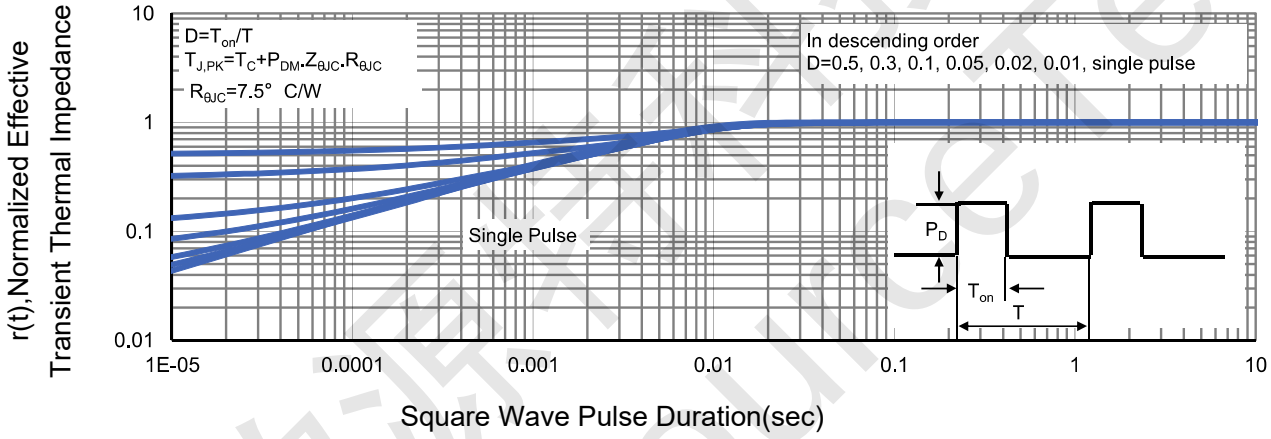


Figure 14 Normalized Maximum Transient Thermal Impedance

PE8215CM P-Channel Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=-250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-0.45	-0.7	-1.1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V,I_D=-5A	-	17.5	21	mΩ
		V_{GS}=-2.5V,I_D=-3A	-	23	28	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=-10V,V_{GS}=0V, F=1.0MHz	-	1200	-	pF
Output Capacitance	C_{oss}		-	140	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	120	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V,I_D=-1A,R_L=1Ω, V_{GS}=-4.5V,R_G=3Ω	-	15	-	nS
Turn-on Rise Time	t_r		-	98.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	42.4	-	nS
Turn-Off Fall Time	t_f		-	19.6	-	nS
Total Gate Charge	Q_g	V_{DS}=-10V,I_D=-5A, V_{GS}=-4.5V	-	21	-	nC
Gate-Source Charge	Q_{gs}		-	2.3	-	nC
Gate-Drain Charge	Q_{gd}		-	2.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-1A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-8	A
Reverse Recovery Time	t_{rr}	I_F=-5A, di/dt=100A/μs	-	30	-	nS
Reverse Recovery Charge	Q_{rr}		-	11	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

PE8215CM Typical Electrical and Thermal Characteristics

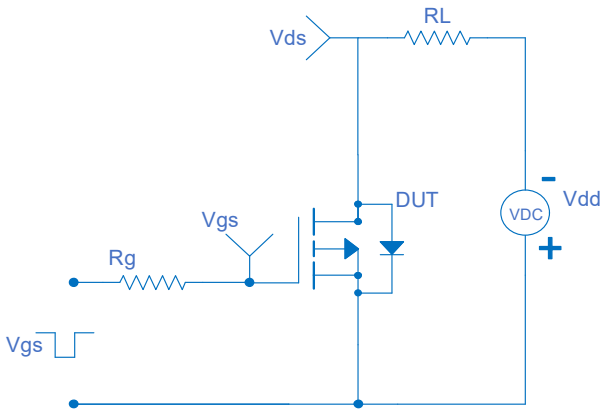


Figure 1 Switching Test Circuit

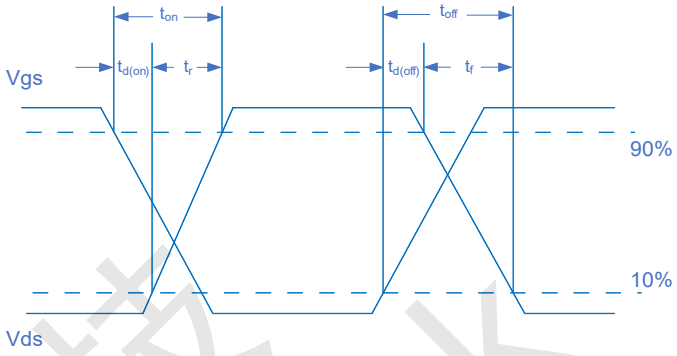


Figure 2 Switching Waveform

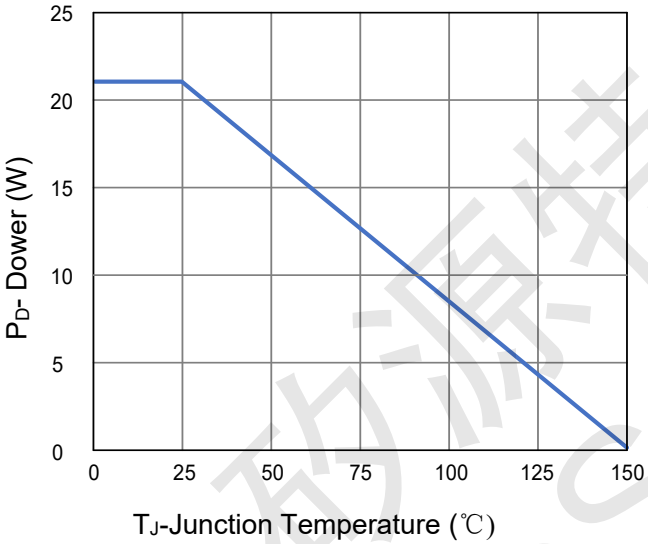


Figure 3 Power De-rating

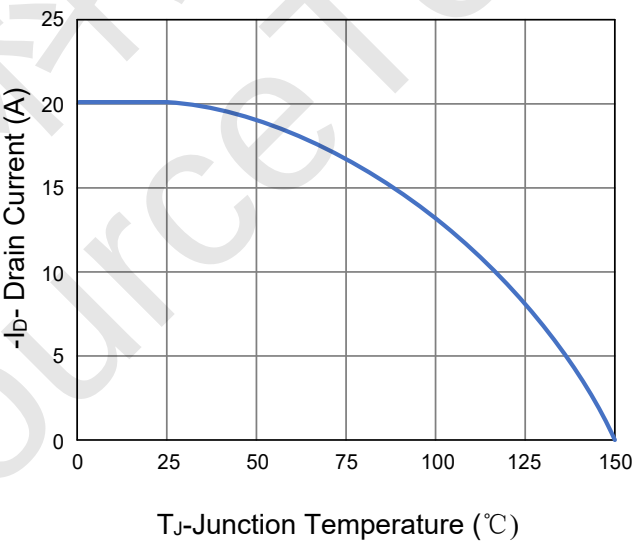


Figure 4 Drain Current

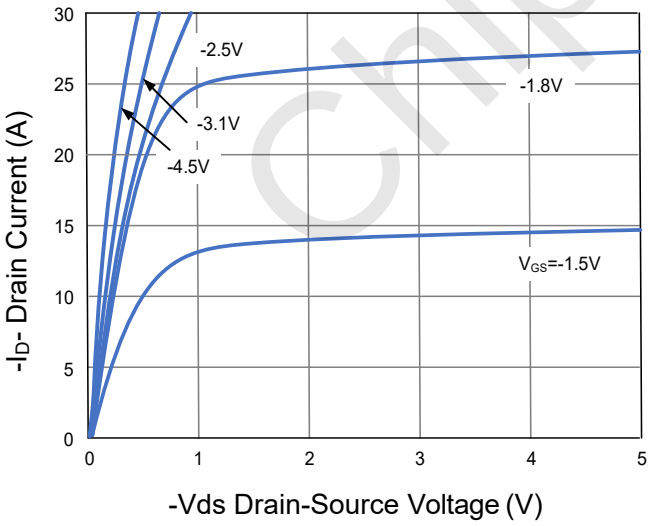


Figure 5 Output Characteristics

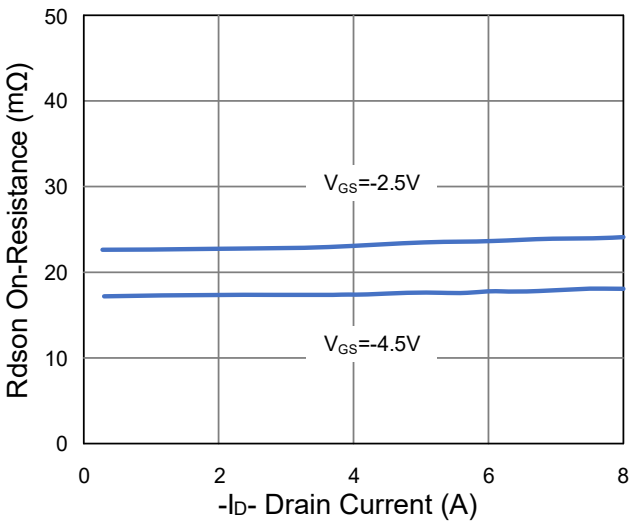


Figure 6 Rdson vs Drain Current

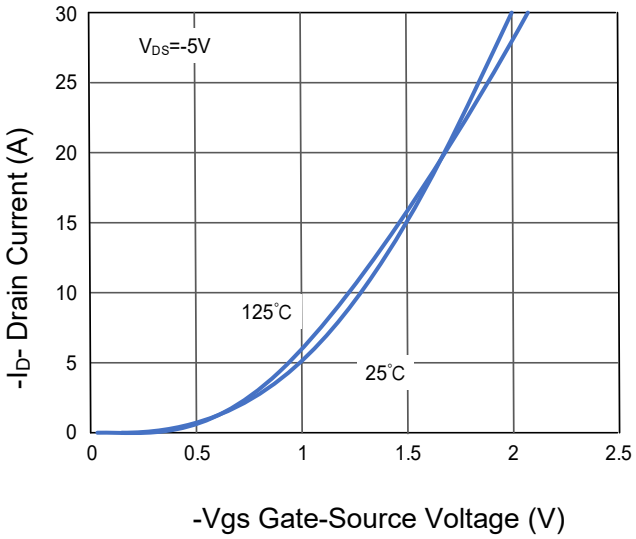


Figure 7 Transfer Characteristics

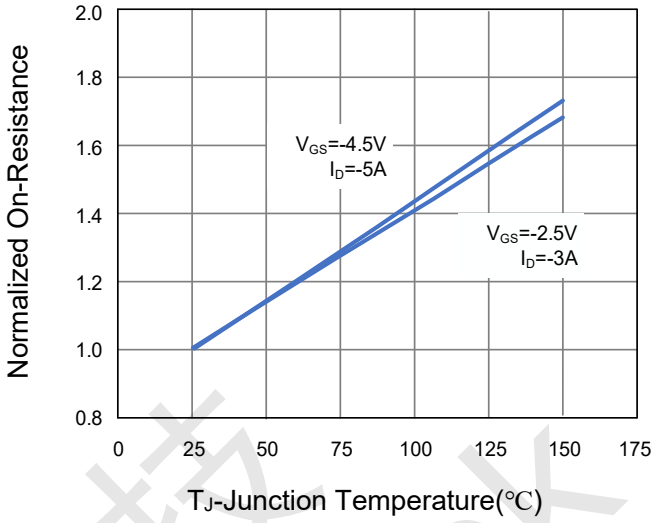


Figure 8 Rdson vs Junction Temperature

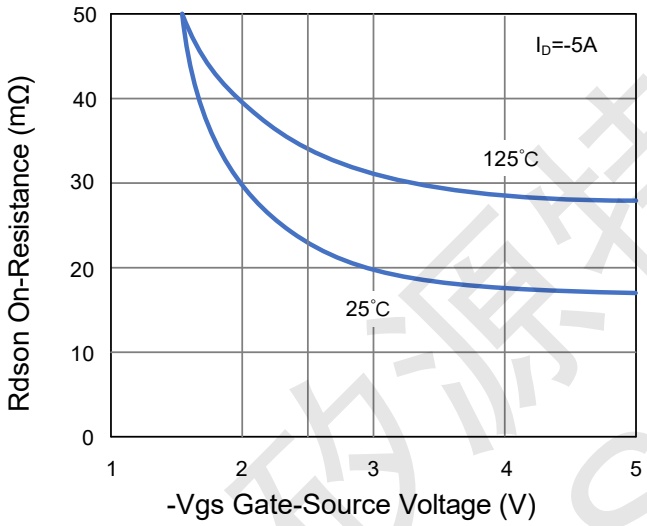


Figure 9 Rdson vs Vgs

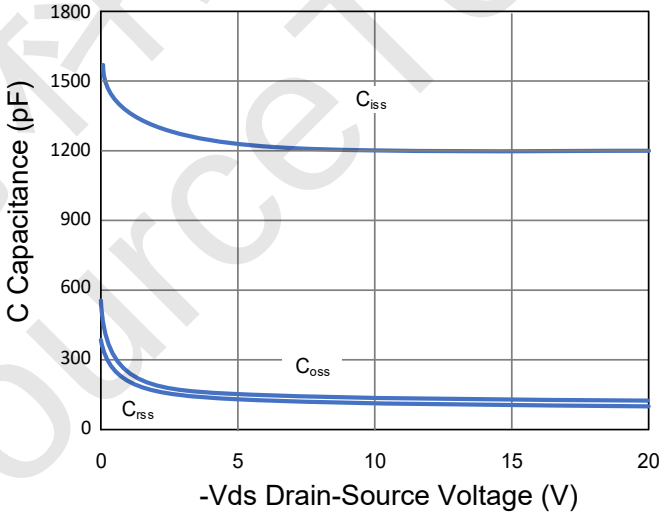


Figure 10 Capacitance vs Vds

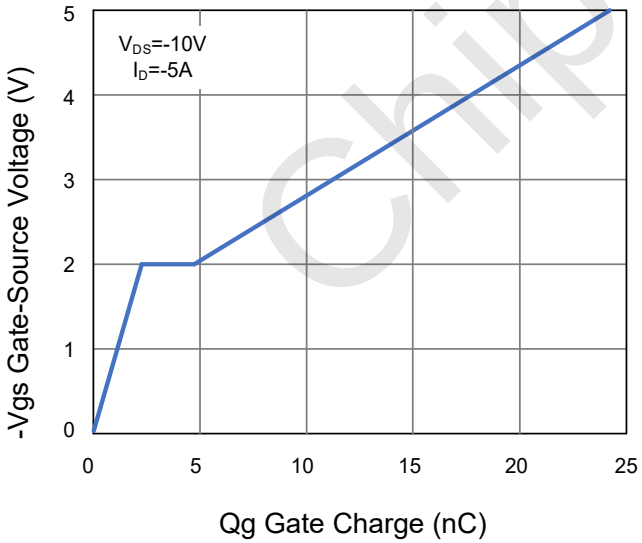


Figure 11 Gate Charge

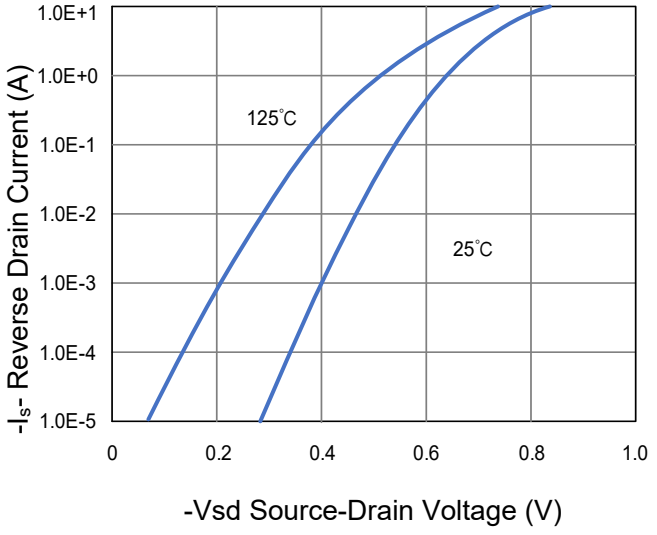


Figure 12 Source- Drain Diode Forward

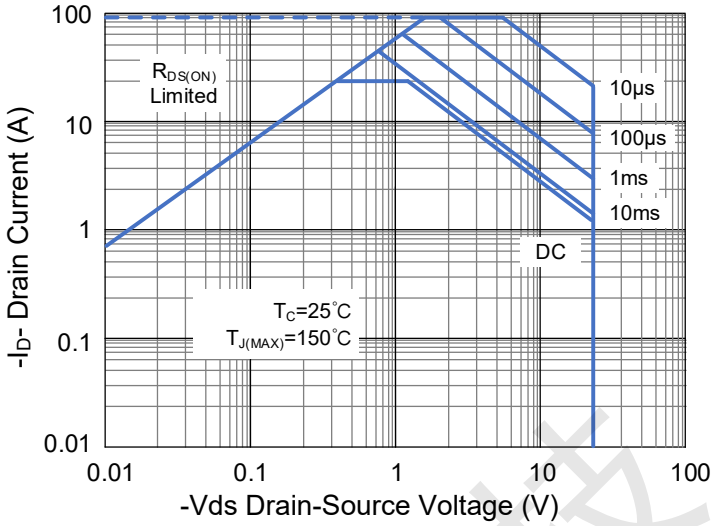


Figure 13 Safe Operation Area

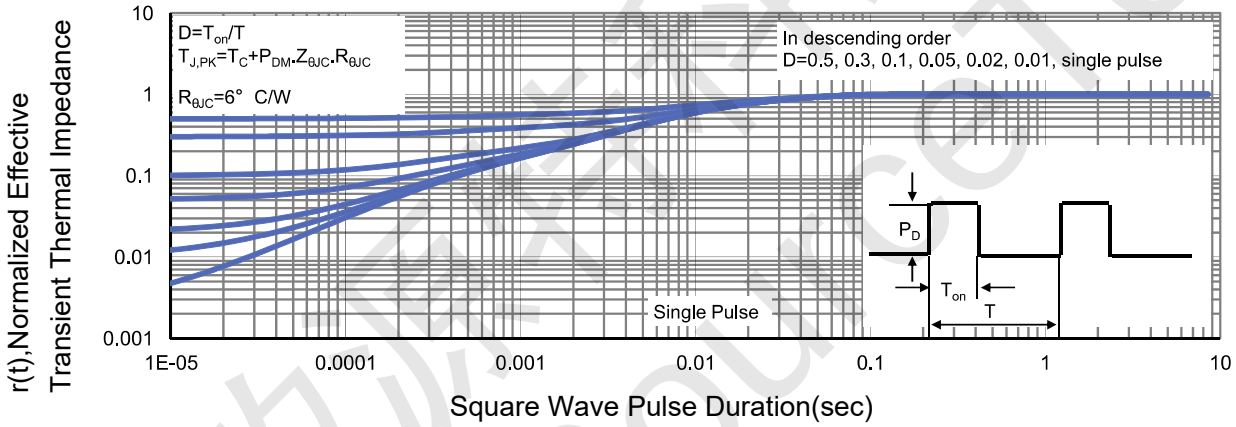
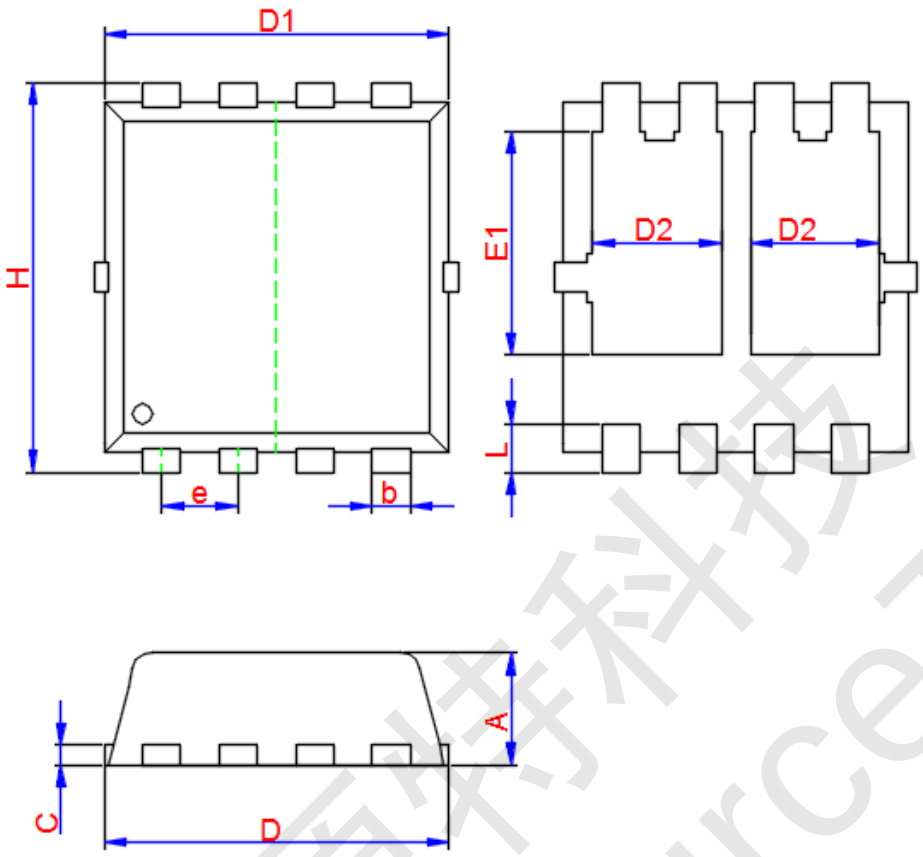


Figure 14 Normalized Maximum Transient Thermal Impedance

PE8215CM PDFN3.3x3.3-8L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.675	0.775	0.875
b	0.300TYP.		
C	0.152TYP.		
D	3.100	3.300	3.500
D1	3.050	3.150	3.250
D2	0.835	1.035	1.235
e	0.650TYP.		
E1	1.530	1.730	1.930
H	3.150	3.350	3.550
L	0.280	0.380	0.480