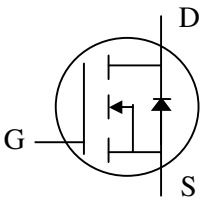
N-channel Enhancement-mode Power MOSFET

RoHS-compliant, Halogen-free

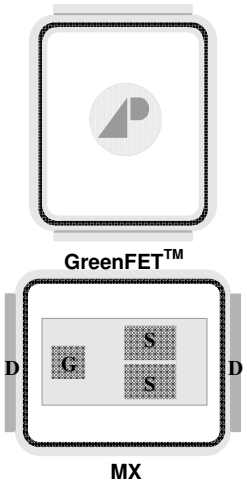
Low Conductance Losses

Ultra-low Forward Diode

Low Profile (< 0.7mm)



BV_{DSS}	25V
$R_{DS(ON)}$	1.8mΩ
I_D	32A



Description

The AP1004CMX-3 uses the latest APEC Power MOSFET silicon technology with advanced technology GreenFET™ packaging to provide the lowest on-resistance, a low profile and dual-sided cooling capability.

The GreenFET™ package is compatible with existing soldering techniques and is ideal for power applications, especially for high-frequency/high-efficiency DC-DC converters.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	25	V
V_{GS}	Gate-Source Voltage	±20	V
I_D at T_A=25℃	Continuous Drain Current[3]	32	A
I_D at T_A= 70℃	Continuous Drain Current[3]	25	A
I_D at T_C=25℃	Continuous Drain Current[4]	160	A
I_{DM}	Pulsed Drain Current[1]	250	A
P_D at T_A=25℃	Total Power Dissipation[3]	2.8	W
P_D at T_A=70℃	Total Power Dissipation[3]	1.8	W
P_D at T_C=25℃	Total Power Dissipation[4]	73.5	W
E_{AS}	Single Pulse Avalanche Energy[5]	28.8	mJ
I_{AR}	Avalanche Current	24	A
T_{STG}	Storage Temperature Range	-40 to 150	℃
T_J	Operating Junction Temperature Range	-40 to 150	℃

Thermal Data

Rthj-c	Maximum Thermal Resistance, Junction-case[4]	1.7	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	45	℃/W

Ordering Information

AP1004CMX-3TR RoHS-compliant halogen-free GreenFET™ MX package, shipped on tape and reel (4800 pcs/reel)

Electrical Specifications at T_j=25℃ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	25	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=32A	-	1.3	1.8	mΩ
		V_{GS}=4.5V, I_D=25A	-	1.9	3.2	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=25A	45	80	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V, V_{GS}=0V	-	-	500	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=25A	-	31.5	50	nC
Q_{gs1}	Pre-V_{th} Gate-Source Charge	V_{DS}=13V	-	5.3	-	nC
Q_{gs2}	Post-V_{th} Gate-Source Charge	V_{GS}=4.5V	-	1.7	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge		-	15.3	-	nC
Q_{godr}			-	9.2	-	nC
Q_{sw}			-	17	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=13V	-	20	-	ns
t_r	Rise Time	I_D=25A	-	130	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G= 1.8Ω	-	25	-	ns
t_f	Fall Time	V_{GS}= 5 V	-	110	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	3300	5280	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	1600	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	350	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)		-	-	32	A
I_{SM}	Pulsed Source Current (Body Diode)[1]		-	-	250	A
V_{SD}	Forward On Voltage[2]	I_S=10A, V_{GS}=0V	-	-	0.75	V
t_{rr}	Reverse Recovery Time[2]	I_S=25A, V_{GS}=0V,	-	60	90	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	75	113	nC

Notes:

1.Pulse width limited by maximum junction temperature.

2.Pulse test

3.Surface mounted on 1 in^2 copper pad of FR4 board.

4.T_C measured with thermocouple mounted to top (Drain) of part.

5.Starting T_j=25°C, L=0.1mH, R_G=25Ω

Typical Electrical Characteristics

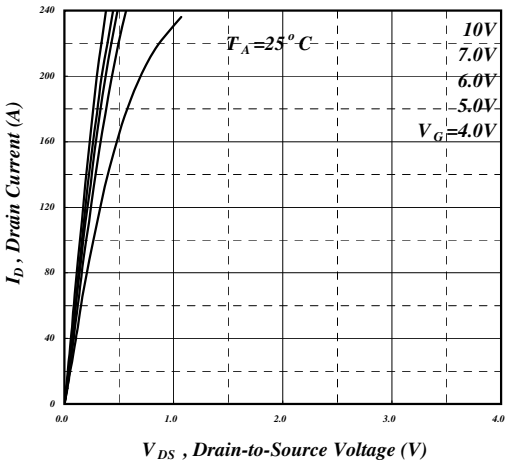


Fig 1. Typical Output Characteristics

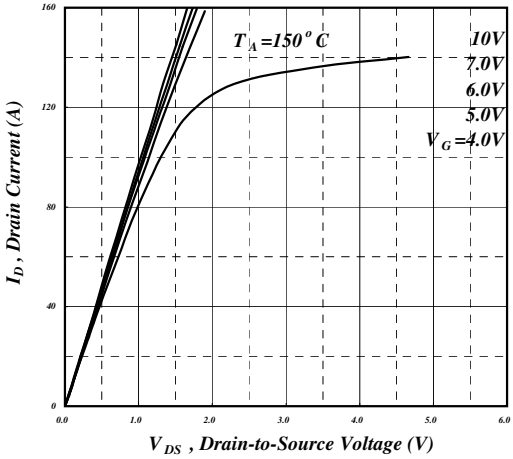


Fig 2. Typical Output Characteristics

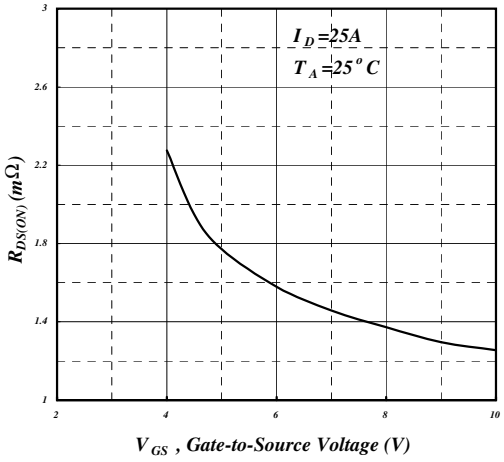


Fig 3. On-Resistance vs. Gate Voltage

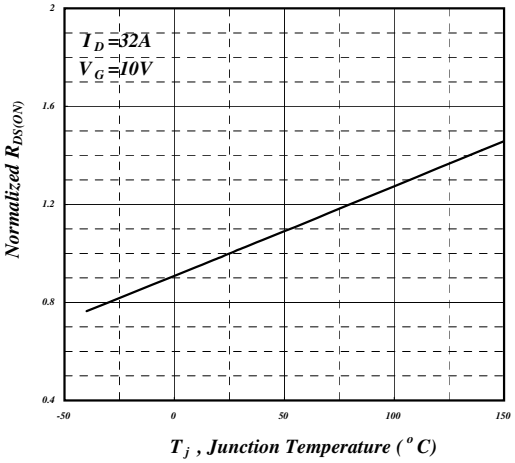


Fig 4. Normalized On-Resistance vs. Junction Temperature

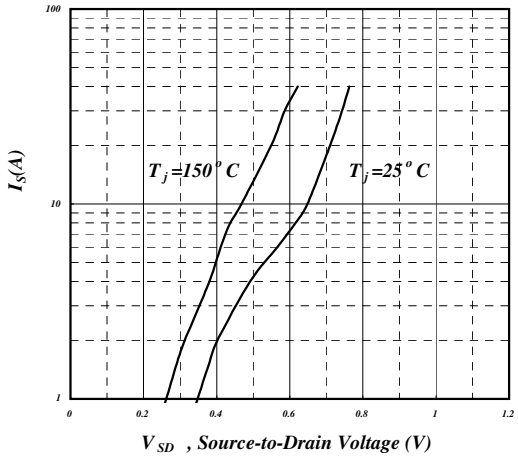


Fig 5. Forward Characteristic of Reverse Diode

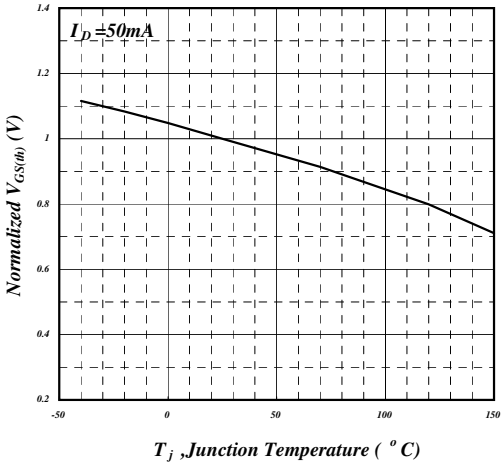


Fig 6. Gate Threshold Voltage vs. Junction Temperature

Typical Electrical Characteristics (cont.)

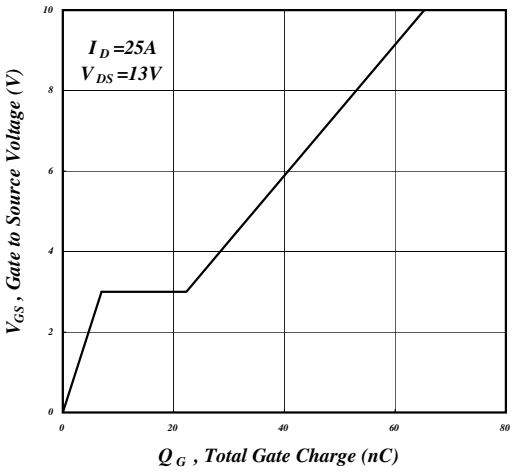


Fig 7. Gate Charge Characteristics

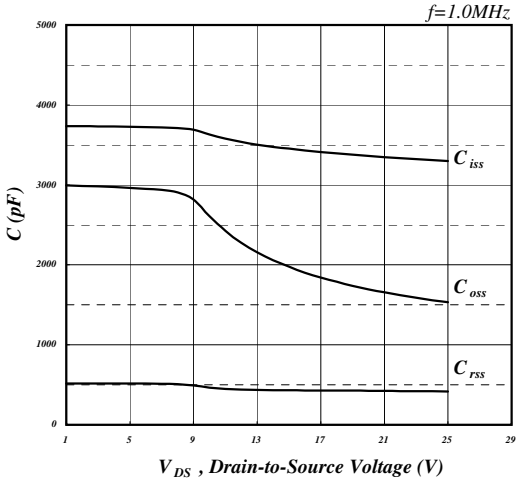


Fig 8. Typical Capacitance Characteristics

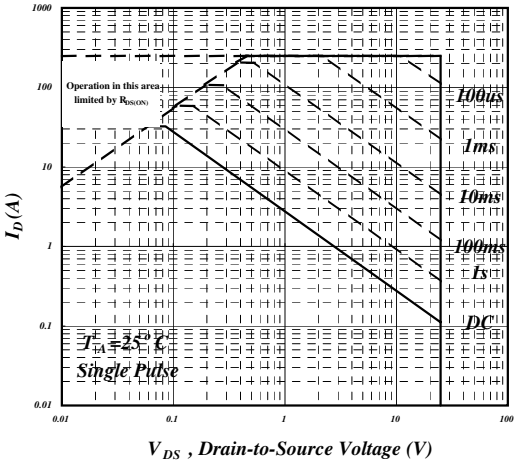


Fig 9. Maximum Safe Operating Area

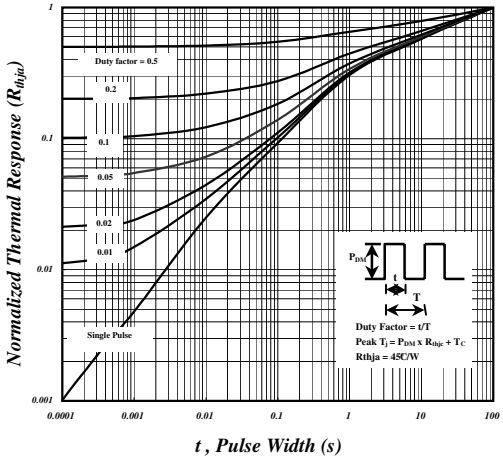


Fig 10. Effective Transient Thermal Impedance

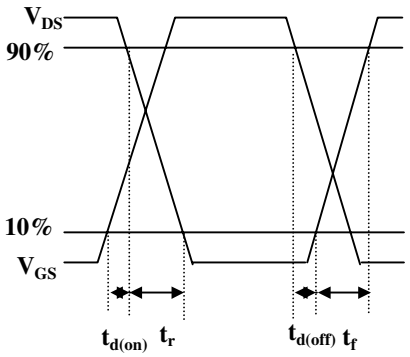


Fig 11. Switching Time Waveform

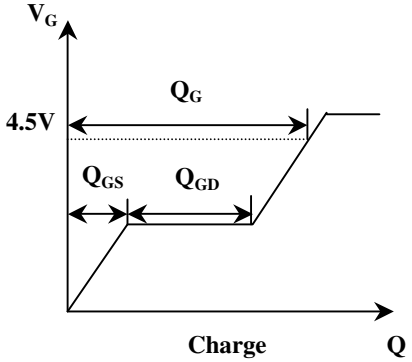
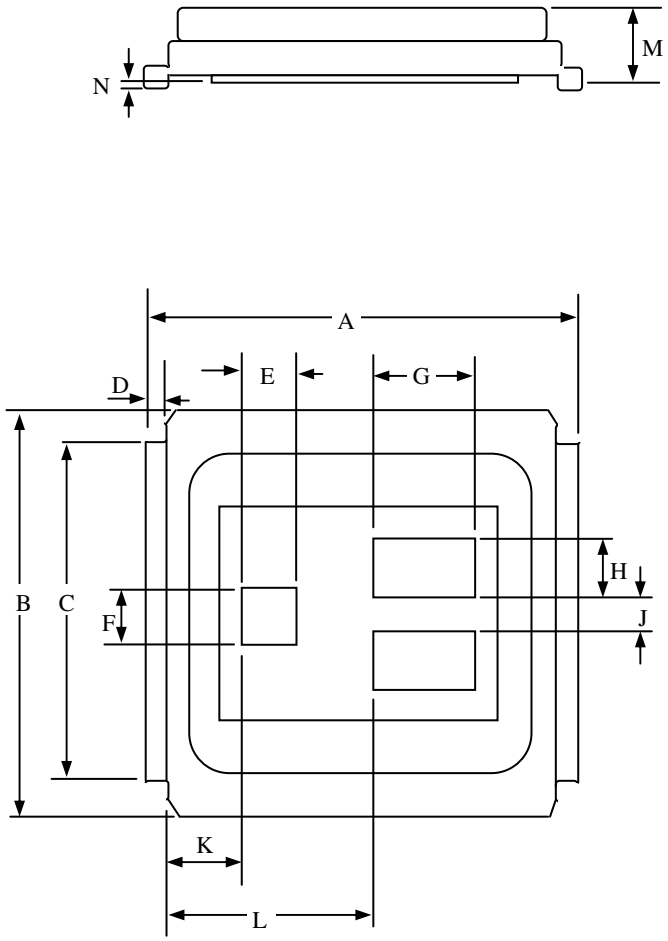


Fig 12. Gate Charge Waveform

Package Dimensions: Medium Size Can MX



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	6.25	6.30	6.35
B	4.80	4.93	5.05
C	3.85	3.90	3.95
D	0.35	0.40	0.45
E	0.68	0.70	0.72
F	0.68	0.70	0.72
G	1.38	1.40	1.42
H	0.80	0.82	0.84
J	0.38	0.40	0.42
K	0.88	0.95	1.01
L	2.28	2.35	2.41
M	0.59	0.65	0.70
N	0.03	0.06	0.08

1. All dimensions are in millimeters.
2. For information on solder stencil and substrate design, please contact APEC at support@a-powerusa.com

Marking Information:

Laser Marking