

Delphi Gen3 GDCI 2.2L Engine: Vehicle Energy Consumption Analysis

Ayman Moawad, Ehsan Islam, Namdoo Kim, Ram Vijayagopal, Aymeric Rousseau

September 06, 2018

Engine and Fuel Characteristics

Engine

Parameter	Units	Value	Comments
Engine Type	GDCI	Gasoline Direct Injection Compression Ignition	
Fuel		US E10 Gasoline RON91 commercial fuel	
B	mm	82	Cyl bore
S	mm	105	Stroke
Displ.	cc	2220	Engine displacement
Max RPM	r/min	4000	Max rated speed
Max Power	kW	147	from simulation
Max Torque	Nm	399	from simulation
Fuel System		GDi	
Boost System		Single-stage Turbocharger	
After treatment		PTC, HCT, GPF, SCR	

Fuel

Parameter	Units	Value	Comments
Fuel	NA	E10 Tier3 Cert Fuel	
Analysis by	NA	Paragon Labs	
LHV	MJ/kg	41.787	net as measured
Spec Density	g/cc	0.748	at 15.5 deg C

Main Vehicle Characteristics

Vehicle Assumptions

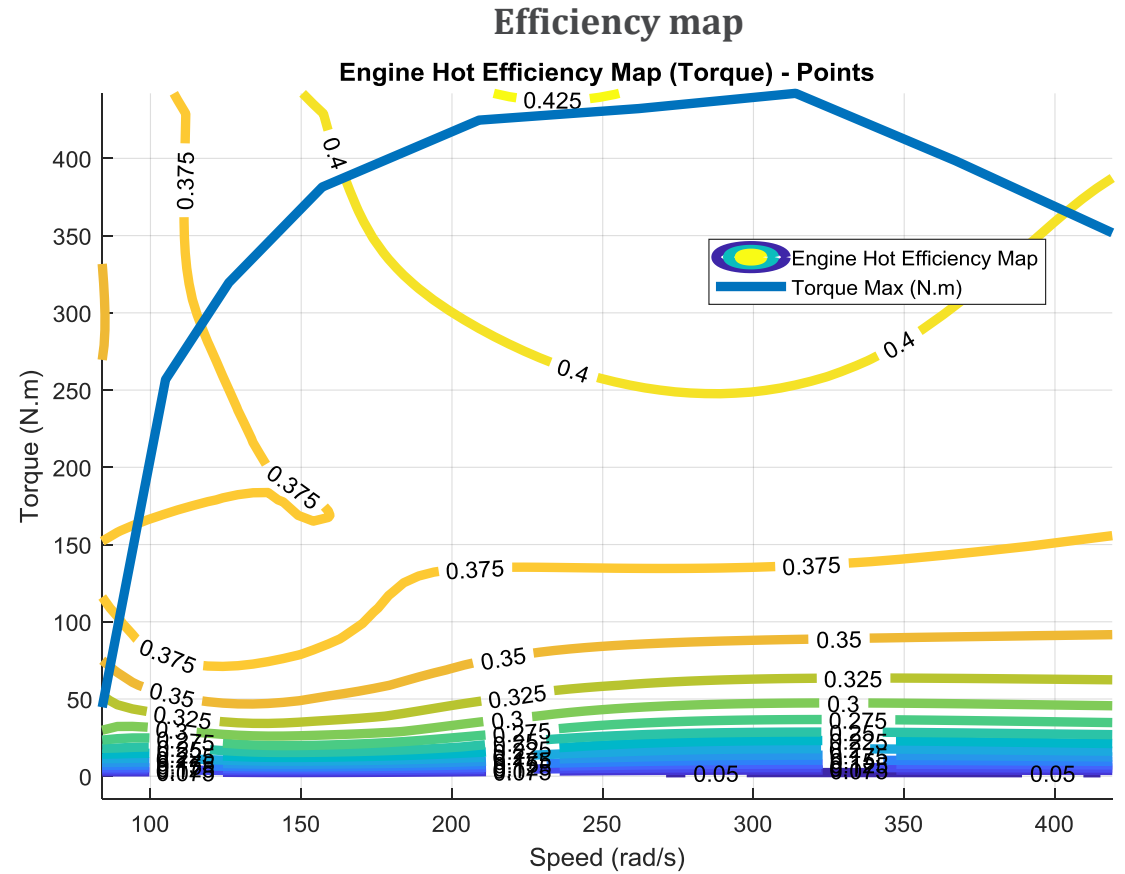
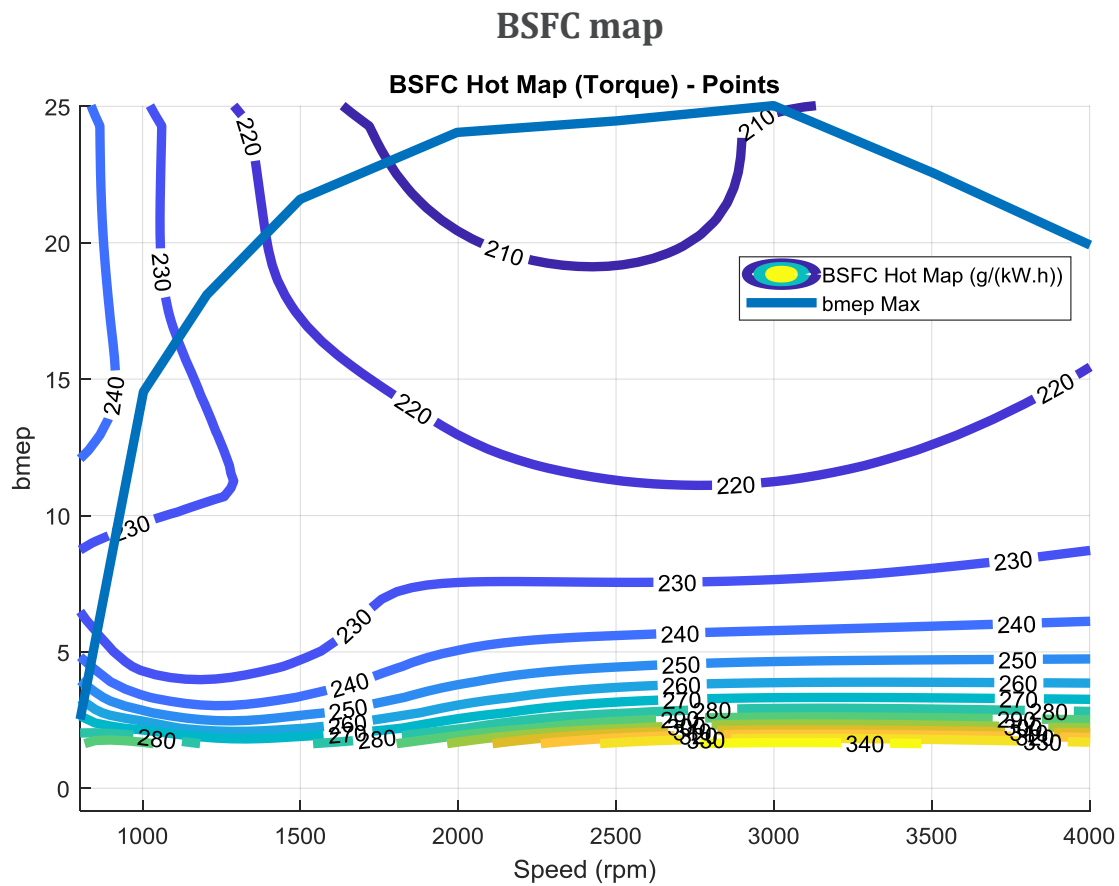
Frontal Area	m ²	2.35
Drag Coefficient	-	0.3
Rolling Resistance	-	0.009
Performance Time	s	9*
Vehicle curb weight	kg	1607
Vehicle class	-	Midsize
Powertrain Considered	-	Conv./12V SS/48V ISG

*Sized to meet vehicle performance 0-60mph in 9 seconds (112kW)

Transmission Assumptions

Transmission	GR1	GR2	GR3	GR4	GR5	GR6	GR7	GR8	GR9	GR10	<i>Final Drive</i>
6-AU	4.074	2.4867	1.6241	1.135	0.8487	0.679					3.65

Gen3 Engine Map and Fuel Economy



(MPG)	UDDS	HWFET	Combined	% From Baseline
2015 Baseline	31.8	42.9	36	
Gen3 6AU Conv.	38.3	48.8	42.4	17.8%

values are unadjusted mpg

*Gen3 fuel economy result includes a 3.5% fuel consumption penalty Resulting from energy losses in cold start and emission control