

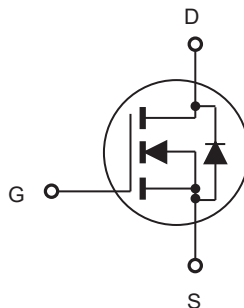


CEP60N60SF/CEB60N60SF CEF60N60SF

N-Channel Enhancement Mode Field Effect Transistor With Fast Body Diode

FEATURES

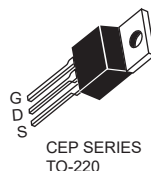
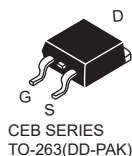
Type	V _{DSS} @T _{Jmax}	R _{DS(ON)}	I _D	@V _{GS}
CEP60N60SF	650V	37mΩ	60A	10V
CEB60N60SF	650V	37mΩ	60A	10V
CEF60N60SF	650V	37mΩ	60A ^d	10V



- Super high dense cell design for extremely low R_{DS(ON)}.
- High power and current handing capability.
- Pb-free lead plating ; RoHS compliant.
- Halogen Free.
- Fast reverse recovery time.

Applications

- PV Inverter.
- EV Charging.
- SMPS.



ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Limit		Units
		TO-220/263	TO-220F	
Drain-Source Voltage	V _{DS}	600		V
Gate-Source Voltage	V _{GS}	±30		V
Drain Current-Continuous @ T _C = 25°C @ T _C = 100°C	I _D	60	60 ^d	A
		38	38 ^d	A
Drain Current-Pulsed ^a	I _{DM} ^e	240	240 ^d	A
Maximum Power Dissipation @ T _C = 25°C - Derate above 25°C	P _D	329	89	W
		2.63	0.71	W/°C
Single Pulsed Avalanche Energy ^g	E _{AS}	364.5		mJ
Single Pulsed Avalanche Current ^g	I _{AS}	9		A
Operating and Store Temperature Range	T _J , T _{stg}	-55 to 150		°C

Thermal Characteristics

Parameter	Symbol	Limit		Units
Thermal Resistance, Junction-to-Case	R _{θJC}	0.38	1.4	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	65	°C/W



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Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			5	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
On Characteristics^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	3		5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		31	37	$m\Omega$
Gate input resistance	R_g	$f=1\text{MHz}, \text{open Drain}$		1.8		Ω
Dynamic Characteristics^c						
Input Capacitance	C_{iss}	$V_{DS} = 400V, V_{GS} = 0V,$ $f = 250\text{KHz}$		3455		pF
Output Capacitance	C_{oss}			110		pF
Reverse Transfer Capacitance	C_{rss}			20		pF
Switching Characteristics^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 16A,$ $V_{GS} = 10V, R_{GEN} = 5.3\Omega$		57		ns
Turn-On Rise Time	t_r			10		ns
Turn-Off Delay Time	$t_{d(off)}$			132		ns
Turn-Off Fall Time	t_f			10		ns
Total Gate Charge	Q_g	$V_{DS} = 400V, I_D = 16A,$ $V_{GS} = 10V$		130		nC
Gate-Source Charge	Q_{gs}			33		nC
Gate-Drain Charge	Q_{gd}			54		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current	I_S^f				60	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 20A$			1.5	V
Reverse Recovery Time	T_{rr}	$I_F = 20A, di/dt = 100A/\mu s$		195		ns
Reverse Recovery Charge	Q_{rr}			1.31		μC
Peak Reverse Recovery Current	I_{rr}			13		A
Notes : a.Repetitive Rating : Pulse width limited by maximum junction temperature . b.Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$. c.Guaranteed by design, not subject to production testing. d.Limited only by maximum temperature allowed . e.Pulse width limited by safe operating area . f.Full package $I_{S(max)} = 31A$. g.L = 9mH, $I_{AS} = 9A, V_{DD} = 60V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.						



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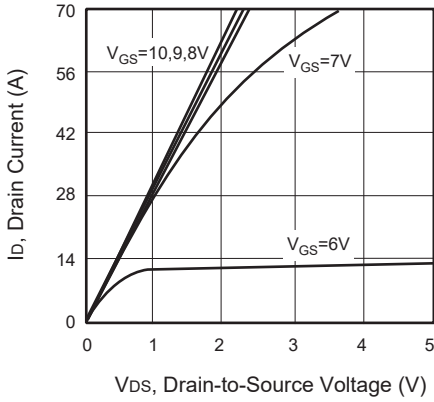


Figure 1. Output Characteristics

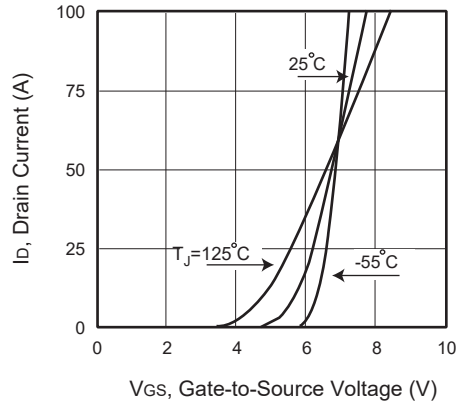


Figure 2. Transfer Characteristics

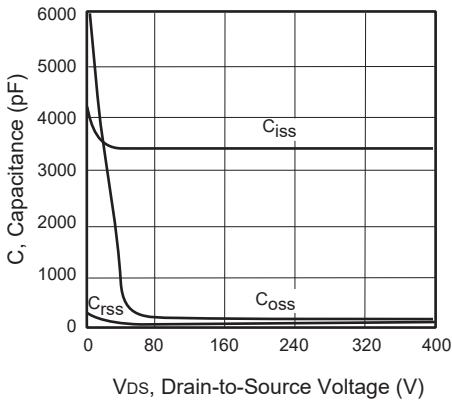


Figure 3. Capacitance

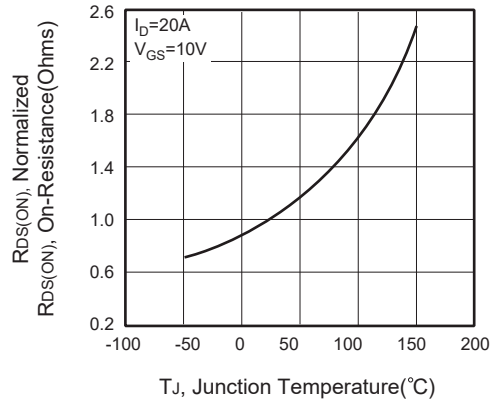


Figure 4. On-Resistance Variation with Temperature

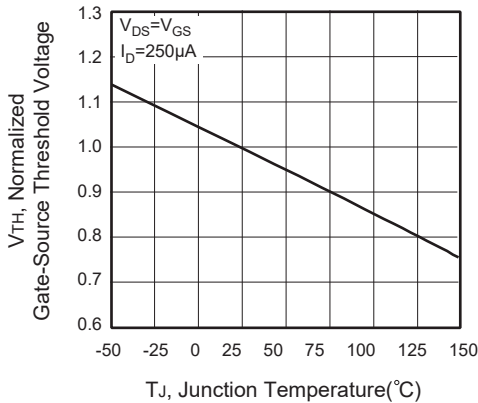


Figure 5. Gate Threshold Variation with Temperature

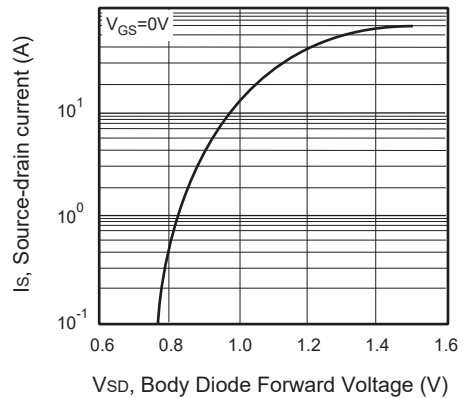


Figure 6. Body Diode Forward Voltage Variation with Source Current

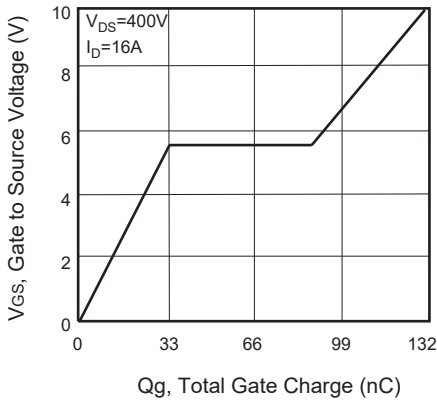


Figure 7. Gate Charge

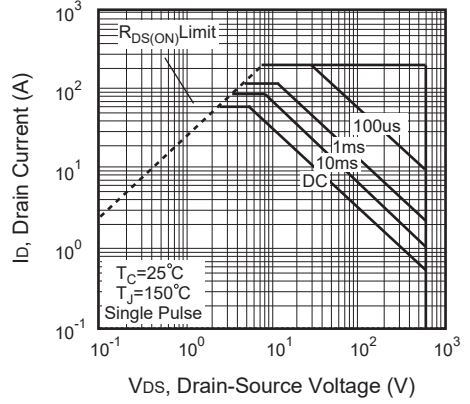


Figure 8. Maximum Safe Operating Area

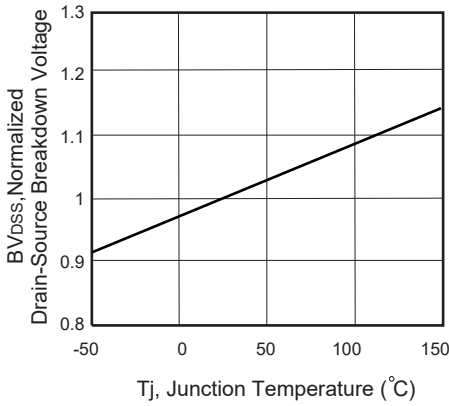


Figure 9. Breakdown Voltage Variation VS Temperature

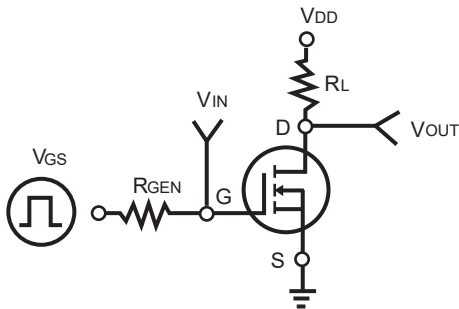


Figure 10. Switching Test Circuit

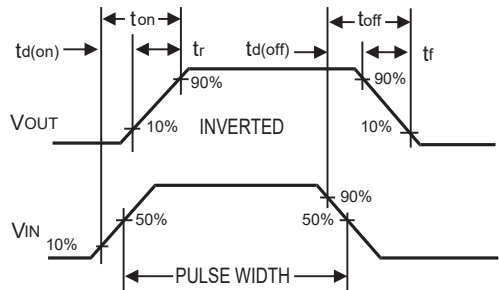


Figure 11. Switching Waveforms



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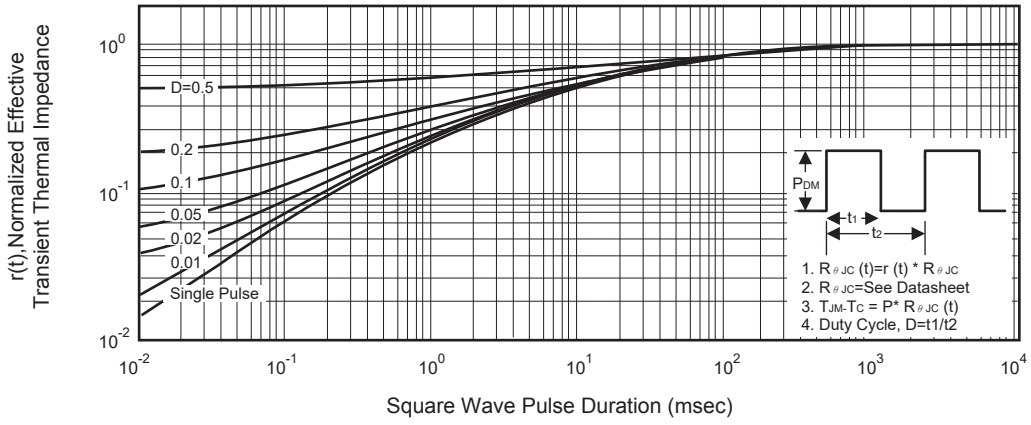


Figure 12. Normalized Thermal Transient Impedance Curve