

N-Channel 250V(D-S) MOSFET

Product summary		
V_{DS}	250	V
$R_{DS(ON)}$ (at $V_{GS}=10V$) Typ.	0.12	Ω
I_D ($T_C=25^{\circ}C$)	40	A

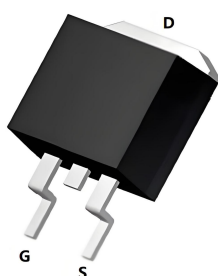
Features

- Low gate charge
- Fast switching
- High ruggedness

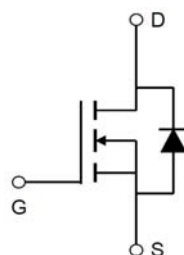
Applications

- Power switching application
- Uninterruptible power supply

Pin Configuration



TO-263



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECFC40N25	TO-263	13"	800pcs

Absolute Maximum Ratings (at $T_A=25^{\circ}C$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		250	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Continuous Drain Current ^A	$T_C=25^{\circ}C$	40	A
		$T_C=100^{\circ}C$	25	A
I_{DM}	Pulse Drain Current Tested ^B		130	A
E_{AS}	Single Pulse Avalanche Energy ^C		1120	mJ
dv/dt	Peak Diode Recovery dv/dt ^D		4.5	V/ns
P_D	Power Dissipation	$T_C=25^{\circ}C$	256	W
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to +150	$^{\circ}C$

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JC}$	Thermal Resistance-Junction to case	0.49	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance-Junction to ambient	62	$^{\circ}C/W$

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	250	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=250V, V_{GS}=0V$	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 30V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=20A$	--	0.12	0.16	Ω
V_{SD}	Diode Forward Voltage	$I_S=40A, V_{GS}=0V$	--	--	1.4	V
I_S	Maximum Body-Diode Continuous Current		--	--	40	A
g_{FS}	Forward Transconductance ^E	$V_{DS}=40V, I_D=20A$	--	22	--	S
Dynamic Parameters ^F						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1\text{MHz}$	--	1560	--	pF
C_{oss}	Output Capacitance		--	370	--	pF
C_{rss}	Reverse Transfer Capacitance		--	150	--	pF
Q_g	Total Gate Charge	$V_{DS}=200V, I_D=40A$ $V_{GS}=10V$ ^{EG}	--	55	--	nC
Q_{gs}	Gate-Source Charge		--	12	--	nC
Q_{gd}	Gate-Drain Charge		--	23	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=125V, I_D=40A,$ $R_G=25\Omega$ ^{EG}	--	30	--	ns
t_r	Turn-on Rise Time		--	35	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	150	--	ns
t_f	Turn-off Fall Time		--	85	--	ns
t_{rr}	Reverse recovery time	$V_{GS}=0V, I_F=40A,$ $di/dt=100\text{ A}/\mu\text{S}$ ^E	--	220	--	ns
Q_{rr}	Reverse recovery charge		--	2	--	nC

A. Drain current limited by maximum junction temperature.

B. Repetitive Rating : Pulse width limited by maximum junction temperature.

C. The EAS data shows Max. rating . The test condition is $V_{DD}=50V, R_G=25\Omega, I_{AS}=40A$.

D. $I_{SD} \leq 40A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

E. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

F. Guaranteed by design, not subject to production testing.

G. Essentially independent of operating temperature.

Typical Characteristics

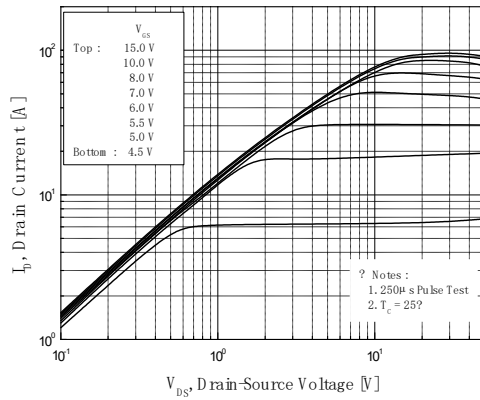


Figure 1. On-Region Characteristics

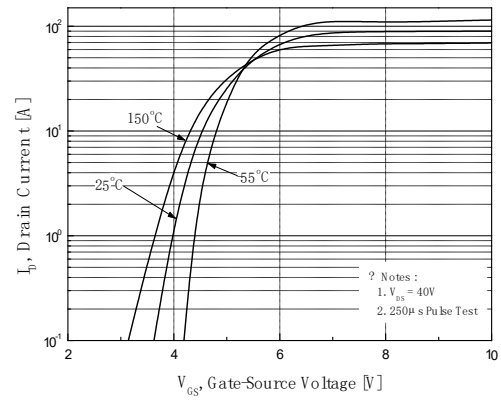


Figure 2. Transfer Characteristics

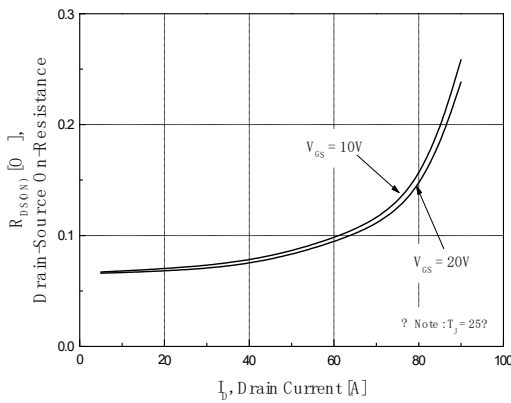


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

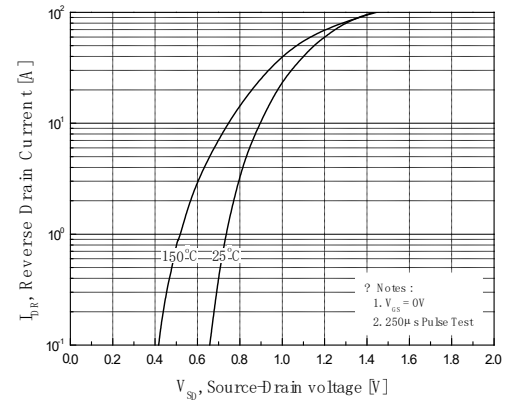


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

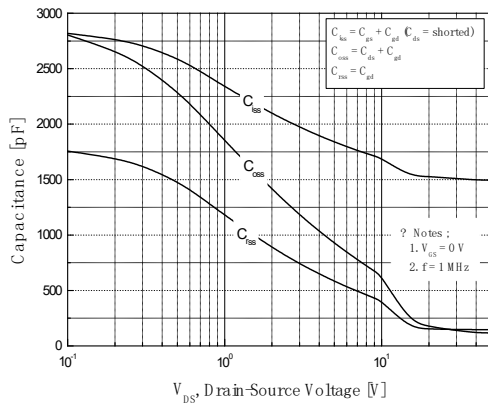


Figure 5. Capacitance Characteristics

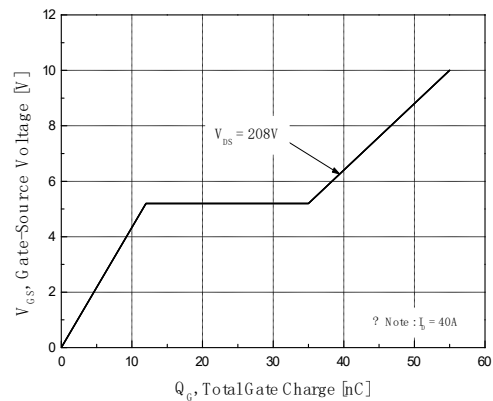


Figure 6. Gate Charge Characteristics

Typical Characteristics

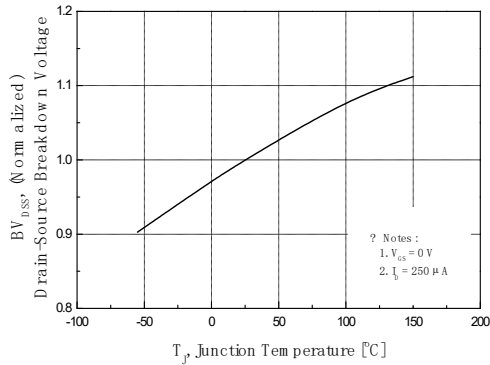


Figure 7. Breakdown Voltage Variation vs Temperature

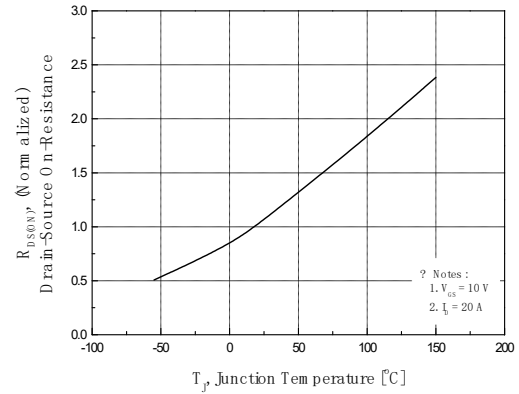


Figure 8. On-Resistance Variation vs Temperature

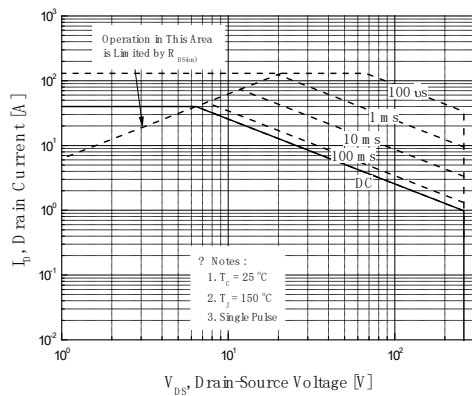


Figure 9-1. Maximum Safe Operating Area

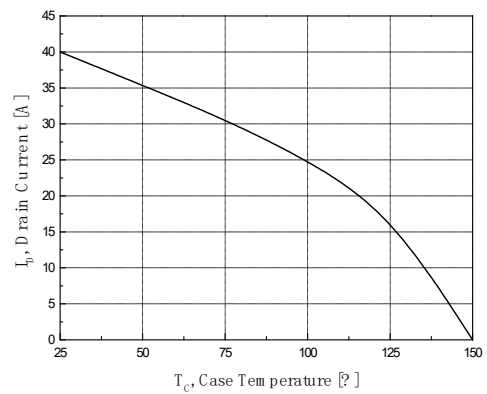


Figure 10. Maximum Drain Current vs Case Temperature

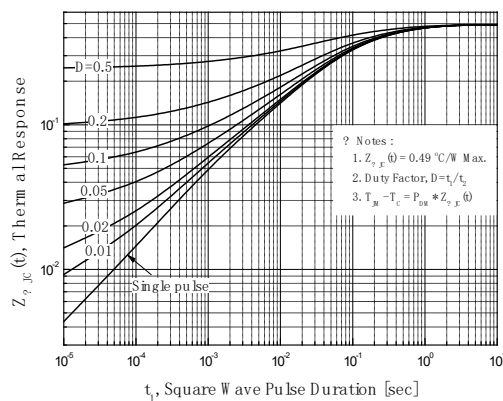
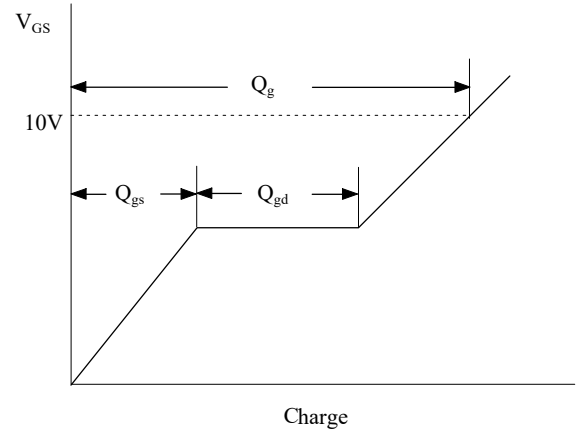
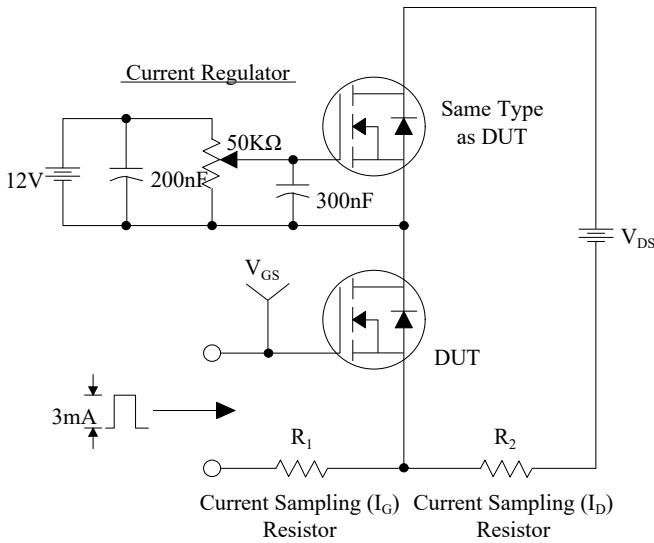


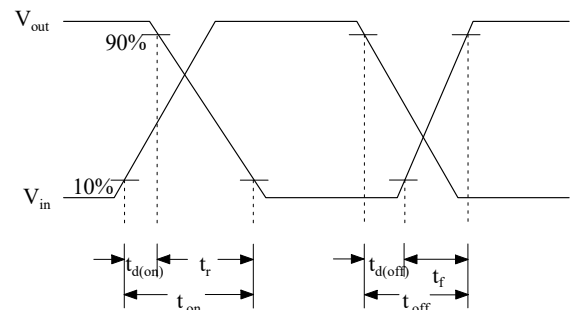
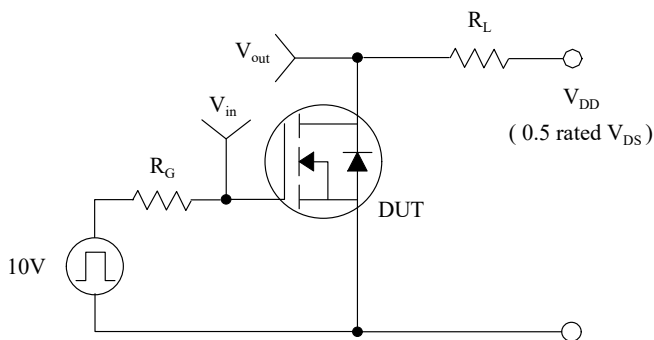
Figure 11. Transient Thermal Response Curve

Test Circuit

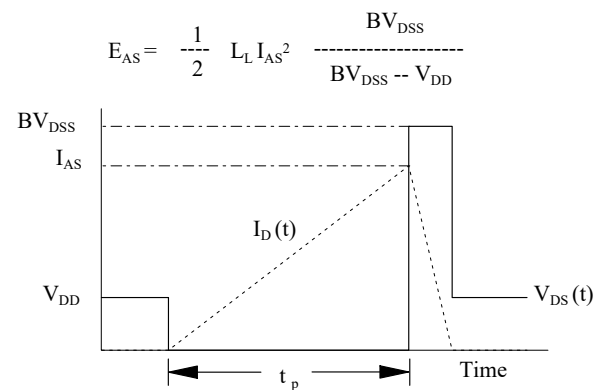
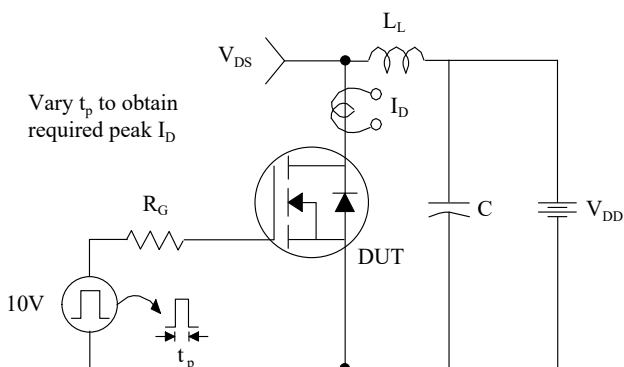
Gate Charge Test Circuit & Waveform



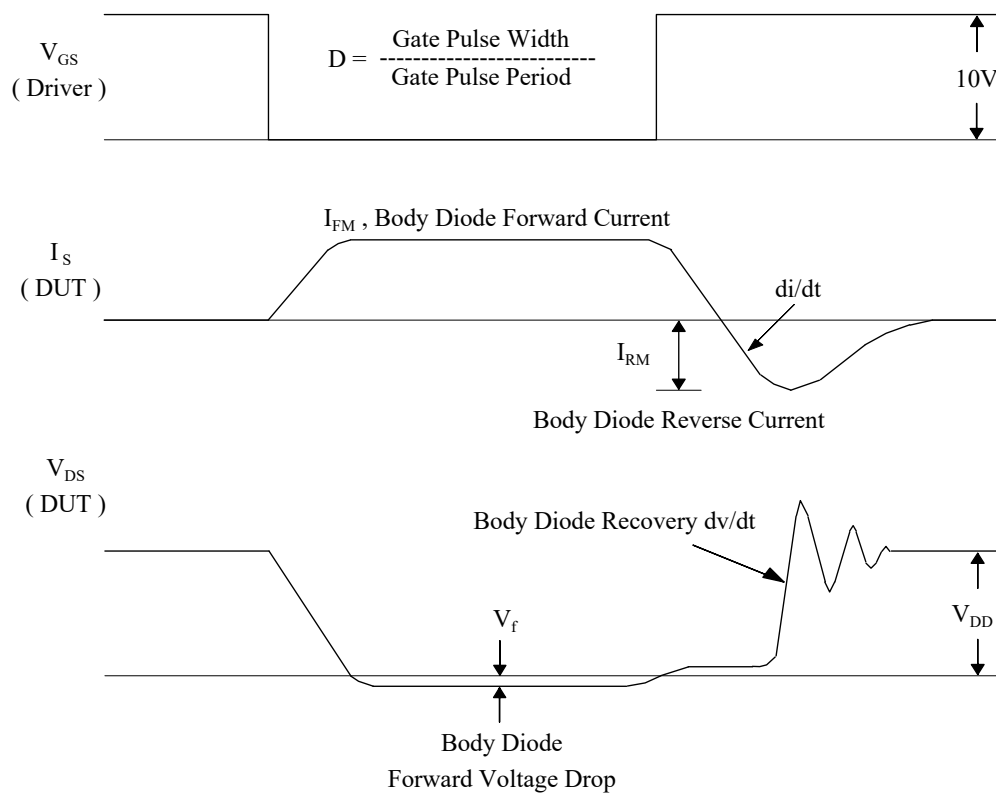
Resistive Switching Test Circuit & Waveforms



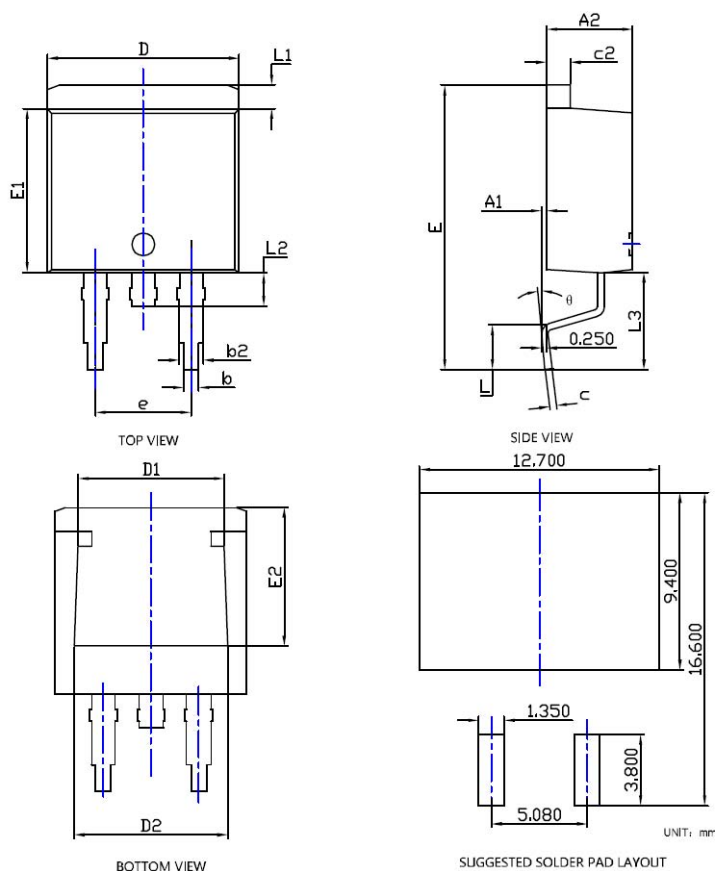
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-263 Package Information



SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.010	0.000	---	0.250
A2	0.174	0.180	0.186	4.430	4.580	4.730
b	0.028	0.032	0.036	0.720	0.820	0.920
b2	0.046	0.050	0.054	1.180	1.280	1.380
c	0.013	0.015	0.018	0.330	0.390	0.450
c2	0.048	0.050	0.053	1.220	1.280	1.34
D	0.394	0.400	0.406	10.000	10.150	10.300
D1	0.295	0.307	0.319	7.500	7.800	8.100
D2	0.303	0.315	0.327	7.700	8.000	8.300
E	0.571	0.591	0.610	14.500	15.000	15.500
E1	0.337	0.341	0.348	8.550	8.700	8.850
E2	0.276	0.287	0.299	7.000	7.300	7.600
e	0.200BSC			5.080BSC		
L	0.070	---	0.110	1.790	---	2.790
L1	0.044	---	0.056	1.120	---	1.420
L2	0.030	---	0.070	0.770	---	1.770
L3	0.197REF			5.000REF		
θ	0°	---	8°	0°	---	8°

NOTE:

- 1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
- 2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
- 3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.