

## N-Channel 100V(D-S) MOSFET

Product summary		
$V_{DS}$	100	V
$R_{DS(ON)}$ (at $V_{GS}=10V$ ) Typ.	3.5	m $\Omega$
$I_D$ ( $T_C=25^{\circ}C$ )	140	A

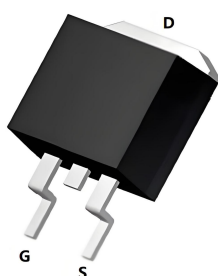
### Features

- Low  $C_{rss}$
- Fast switching
- Very Low On-resistance  $R_{DS(ON)}$

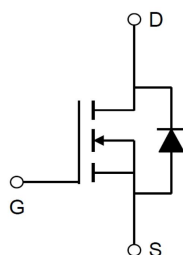
### Applications

- PWM Application
- Load switching

### Pin Configuration



TO-263



### Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECFC140N10	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	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^{\circ}C$	140
		$T_C=100^{\circ}C$	88
$I_{DM}$	Pulse Drain Current Tested <sup>A</sup>	560	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>B</sup>	400	mJ
$P_D$	Power Dissipation $T_C=25^{\circ}C$	196	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	0.64	$^{\circ}C/W$
$R_{\theta JA}$	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 <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V,I <sub>D</sub> =250uA	100	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =100V,V <sub>GS</sub> =0V	--	--	1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> =0V,V <sub>GS</sub> =±20V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250uA	2.3	2.9	3.7	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance <sup>B</sup>	V <sub>GS</sub> =10V,I <sub>D</sub> =20A	--	3.5	4.6	mΩ
Dynamic Parameters <sup>D</sup>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V,V <sub>DS</sub> =25V f=1MHZ	--	3520	--	pF
C <sub>oss</sub>	Output Capacitance		--	1902	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	71	--	pF
R <sub>g</sub>	Gate Resistance	f = 1MHz	--	3.9	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =80V,I <sub>D</sub> =80A V <sub>GS</sub> =10V	--	50	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	14	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	12	--	nC
t <sub>D(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =80V,V <sub>GS</sub> =10V, I <sub>D</sub> =80A, R <sub>G</sub> =10Ω	--	25	--	ns
t <sub>r</sub>	Turn-on Rise Time		--	96	--	ns
t <sub>D(off)</sub>	Turn-off Delay Time		--	61	--	ns
t <sub>f</sub>	Turn-off Fall Time		--	120	--	ns
Drain-Source Diode Characteristics						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	140	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	560	A
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =20A,V <sub>GS</sub> =0V	--	--	1.1	V
t <sub>rr</sub>	Reverse recovery time	I <sub>F</sub> =80A, di/dt=100 A/us	--	51	--	ns
Q <sub>rr</sub>	Reverse recovery charge		--	30	--	nC

A. Repetitive Rating : Drain current limited by the package.

B. The EAS data shows Max. rating . The test condition is  $T_J=25^\circ\text{C}, V_{DD}=100V, V_{GS}=10V, L=0.5\text{mH}, I_{AS}=40A$ .

C. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 0.5\%$ .

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

## Typical Characteristics

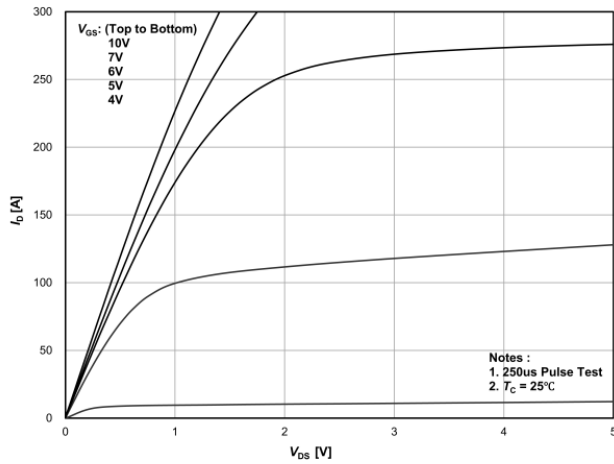


Figure 1. On-Region Characteristics

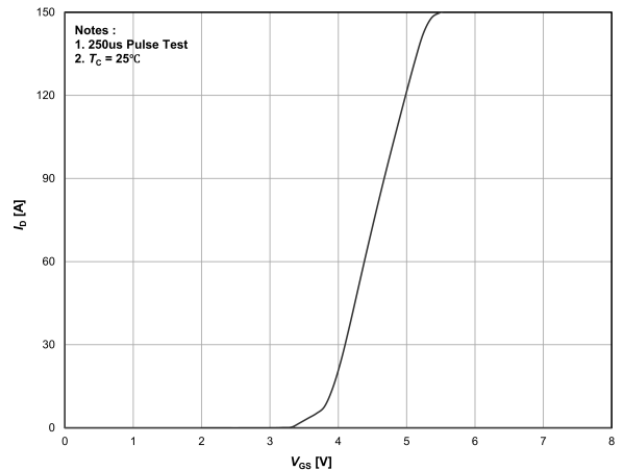


Figure 2. Transfer Characteristics

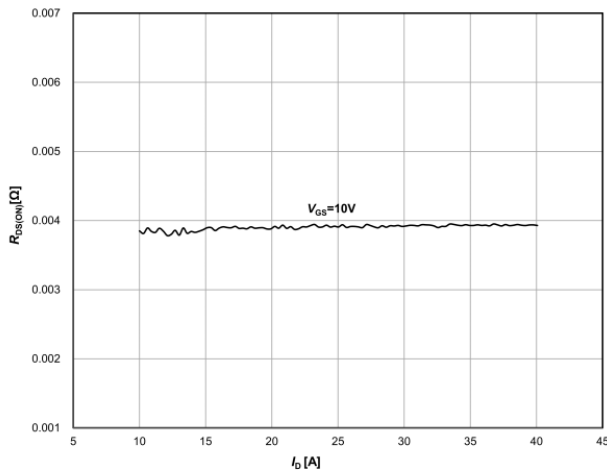


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

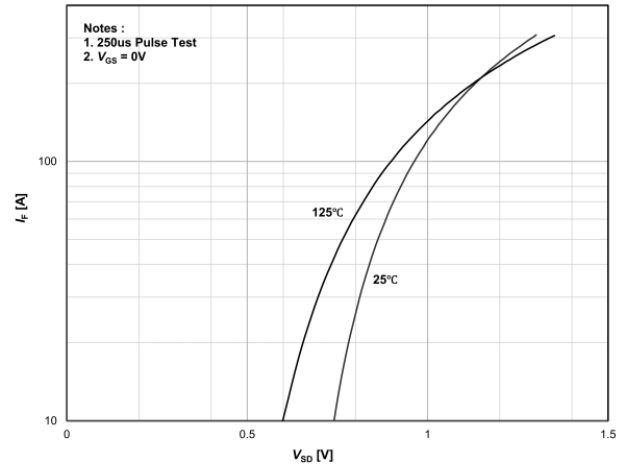


Figure 4. Body Diode Forward Voltage Variation with Source Current

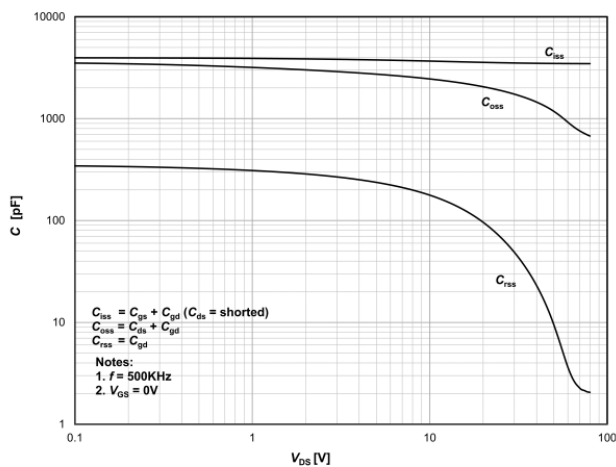


Figure 5. Capacitance Characteristics

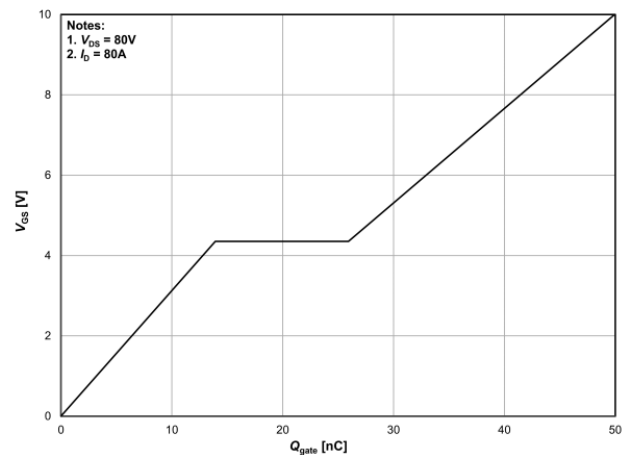
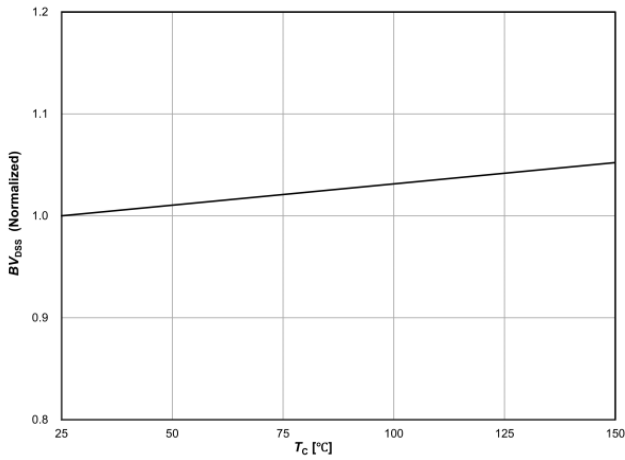
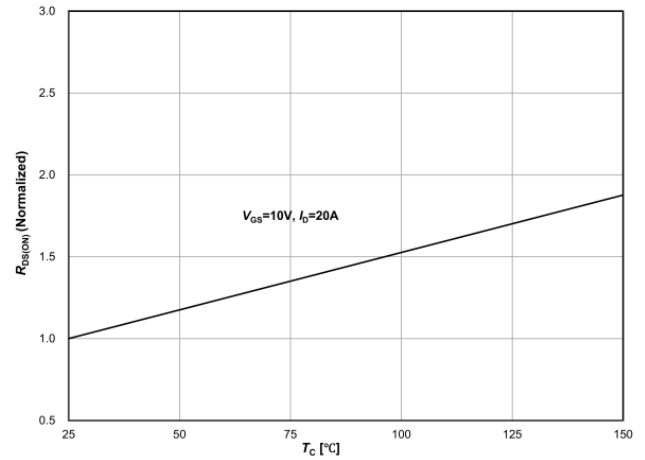


Figure 6. Gate Charge Characteristics

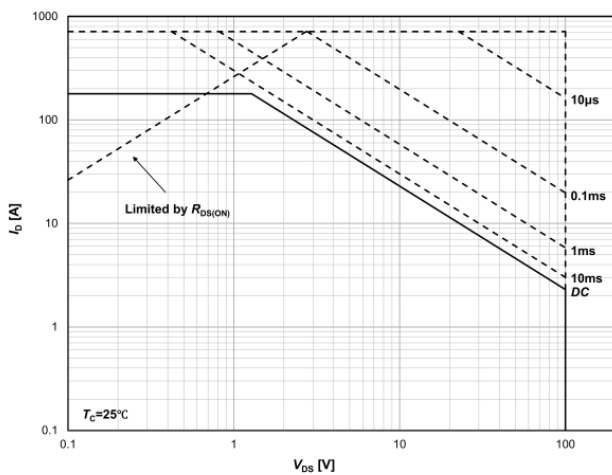
## Typical Characteristics



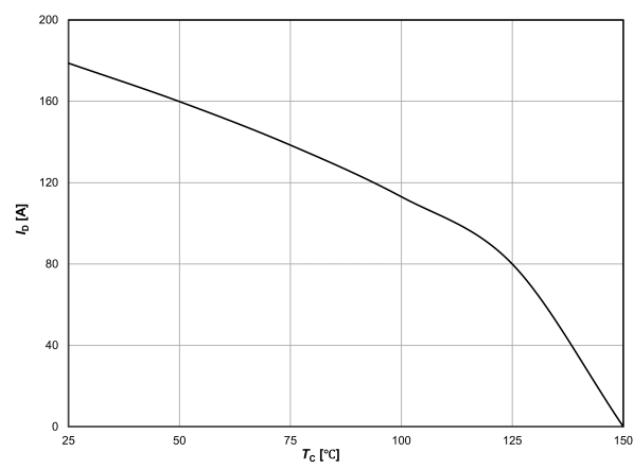
**Figure 7. On-Resistance Variation vs Temperature**



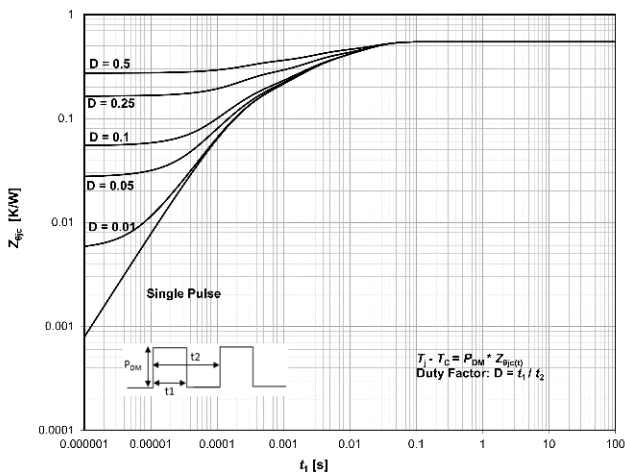
**Figure 8. Breakdown Voltage Variation vs Temperature**



**Figure 9. Maximum Safe Operating Area<sup>3)</sup>**

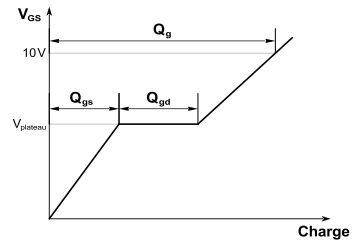
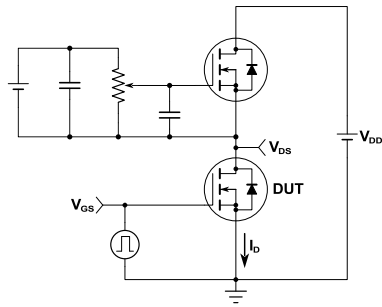


**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

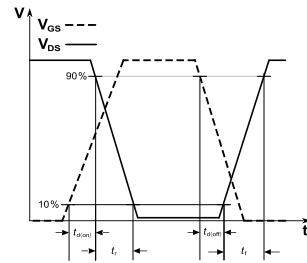
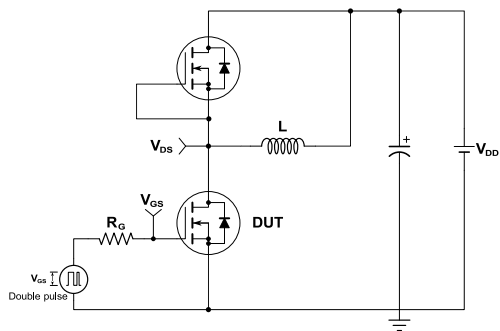


**Figure 11. Transient Thermal Response Curve**

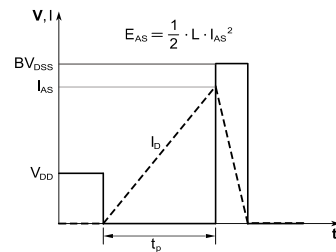
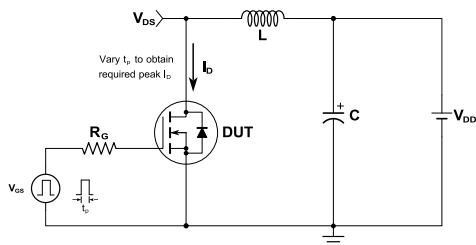
## Test Circuit



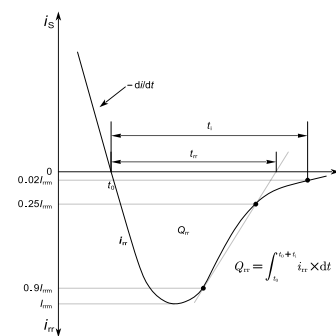
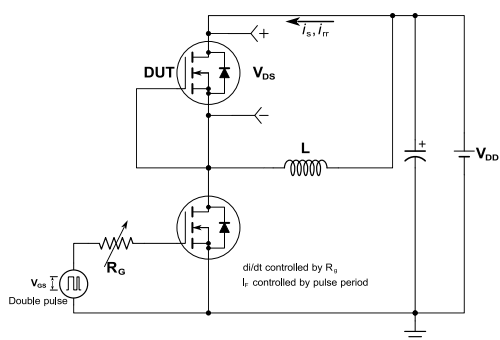
**Gate charge test circuit & waveform**



**Switching times for inductive load test circuit & waveform**

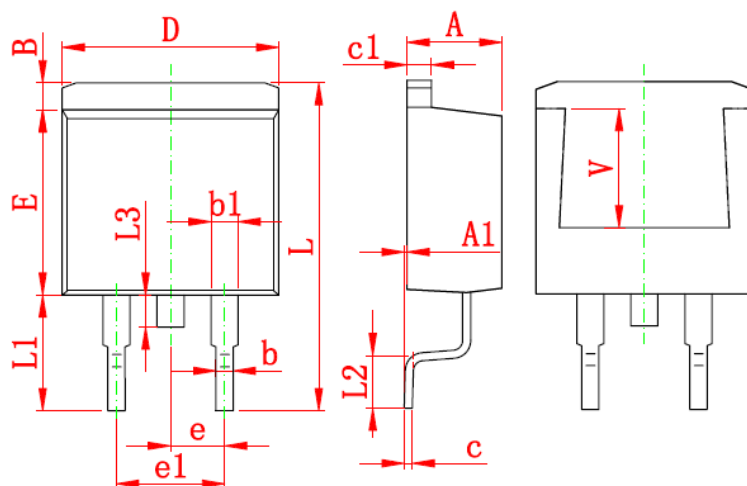


**Unclamped inductive load test circuit & waveform**



**Diode characteristics test circuit & waveform**

## TO-263 Package Information



\*:Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184	E	8.500	8.900	0.335	0.350
A1	0.000	0.150	0.000	0.006	e	*2.540		*0.100	
B	1.170	1.370	0.046	0.054	e1	4.980	5.180	0.196	0.204
b	0.710	0.910	0.028	0.036	L	15.050	15.450	0.593	0.608
b1	1.170	1.370	0.046	0.054	L1	5.080	5.480	0.200	0.216
c	0.310	0.530	0.012	0.021	L2	2.340	2.740	0.092	0.108
c1	1.170	1.370	0.046	0.054	L3	1.300	1.700	0.051	0.067
D	10.010	10.310	0.394	0.406	V	5.600	REF	0.220	REF

Notes : 1.Controlling dimension : millimeters.

2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

## Material :

- Lead : Pure tin plated.
- Mold Compound : Epoxy resin family, flammability solid burning class:UL94V-0.